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# USSR Report

## SCIENCE AND TECHNOLOGY POLICY

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PARTY SCIENTIFIC, TECHNICAL POLICY EXAMINED

Moscow POLITICHESKOYE SAMOOBRAZOVANIYE in Russian No 4, Apr 84 pp 33-40

[Article by V. Kushlin: "The Unified Scientific and Technical Policy of the Party"]

[Text] The Communist Party and the Soviet State attach paramount importance to the systematic development of science and technology. Historical experience attests that on the long-term, strategic level scientific and technical progress, for which the production relations of socialism afford extensive prospects, should be regarded as an inexhaustible source of economic and social development and the steady increase of the well-being of all the people.

Our country, as was noted at the June (1983) CPSU Central Committee Plenum, has now approached such a historical point, when profound qualitative changes in the productive forces and the improvement of production relations, which corresponds to this, not only have ripened, but have also become inevitable. While the main means of such changes is the changeover to intensive development and the combination in practice of the advantages of the socialist system with the achievements of the scientific and technical revolution. A technological revolution in many spheres of production, which promises the consistent use of the very latest achievements of this revolution, in practice is impossible without a purposeful scientific and technical policy, which is formulated by the party and state and is implemented by the efforts of all the Soviet people. "Intensification, the rapid introduction in production of the achievements of science and technology, the implementation of major comprehensive programs--all this in the end," Comrade K. U. Chernenko said at the Extraordinary February (1984) Party Central Committee Plenum, "should raise the productive forces of our society to a qualitative new level. And the greater the scale of the use of the achievements of science and technology in the national economy is, the more significant the role of the formulation and implementation of the scientific and technical policy of the party is.

What is the unified scientific and technical policy of the society of mature socialism?

By scientific and technical policy they usually understand a system of economic, organizational and educational measures of the party, the state and collectives of workers on the identification, selection and use of the most efficient methods, forms and directions of the development of science and technology, the ways and means of the effective embodiment of their achievements in production and other spheres of social life in conformity with the goals of economic and social development. Under the conditions of the socialist system, the public ownership of the means of production, the collective nature of production relations and centralized planning it, of course, can be effectively implemented only as a unified statewide policy. This policy should be implemented on the basis of a general plan and unified directions at all the levels of the economic structure--from the national economy, the sector and the region to the enterprise, the organization and their subdivisions--as a party policy.

The possibility of the formulation and systematic implementation of a scientific and technical policy, which is unified on the scale of the country, in conformity with the long-term interests of all the people is a great advantage of the socialist economic system. Nothing of the sort exists in any capitalist country.

Each sector of the national economy, socialist enterprise and scientific organization formulates its own program in the scientific and technical area and submits to superior organs proposals on the accomplishment of specific tasks of scientific and technical development, which can be included as components in the structure of all-union, long-term plans on science and technology. Without such participation of "local" organizations it is impossible to imagine the effective formulation of a policy in the area of science and technology for the entire country. But the unified scientific and technical policy is not a mechanical sum of all the available (sectorial, regional and other) scientific and technical programs. It is elaborated by the party and central state organs on the basis of general aims and a conception, which originate from the logic of the development of the scientific and technical revolution, and strategic national economic tasks.

Being a component of the strategy of the building of communism, the unified scientific and technical policy is the most important section of the long-range economic and social policy of the party, which takes into account the fundamental goals of the socioeconomic development of the country. The public ownership of the means of production, the existence of which also gives rise to the objective possibility of the unity of goals and systematicness in the activity of the entire "national cooperative of working people" on the development of productive forces, serves as the main integrating factor of the scientific and technical policy. This policy is called upon to serve such development of the production apparatus, which promotes the increase of the production of the gross national product with the least possible expenditures of living and embodied labor on the basis of the best use of the available manpower, material, raw material, energy, financial and other resources. While in the end it serves the increase of the well-being of the working people both during the current period and in the future and has a pronounced social orientation.

The knowledge of the laws of nature and society and their objective interrelationship, which is constantly being extended, is increasing the soundness and integrity of the scientific and technical policy, which, in turn, acts as a prerequisite of the formation of a sound economic and social policy as a whole. Such a function of it is dictated by the fact that the finding of fundamentally new means of the process of equipment and technology and of the revolutionary transformation of productive forces is connected today with the successes of scientific knowledge.

With the extension of the scientific knowledge of the laws of nature and society and the enrichment of the potential of scientific and technical achievements and in conformity with the changes in the priorities of the goals and tasks, which are posed for socialist society, the scientific and technical policy, of course, is refined and given concrete expression. But in its main content it is characterized by strategic stability and continuity. On the long-term level it is possible to characterize it today first of all as the strategy of the gradual formation of the material and technical base of communism on the basis of the combination of the achievements of the scientific and technical revolution with the advantages of our social system, as the strategy of the achievement of the highest level of the productivity of national labor in the world, which creates the conditions for the systematic increase of the well-being and the all-round development of the members of society.

The specific content and goals of the scientific and technical policy are specified and refined by the party and government at each stage of the development of the country as applied to the conditions of the corresponding historical period. The main directions of scientific and technical progress are outlined and substantiated, measures, which are called upon to provide the best conditions for their realization, are elaborated.

The concern of the party about the comprehensive development of science and technology in the country appears with the very first days of the existence of the Soviet state. In April 1918 the famous "Draft of the Plan of Scientific and Technical Work" was signed by V. I. Lenin. A special plan of "work on the restoration of the entire national economy and its bringing up to the level of modern technology"--the plan of the State Commission for the Electrification of Russia--was drawn up under the supervision of the party. "In my opinion," V. I. Lenin said, "this is our second party program" (Vol 42, p 157).

The plan of the State Commission for the Electrification of Russia was the first unified state plan of the development of the national economy on the basis of its electrification and the extensive introduction of new equipment. The subsequent formation of the unified scientific and technical policy as an important sphere of party activity took place during the years of the first five-year plans, when the material and technical base of socialism was basically created in our country. The possibilities, which are inherent in the socialist social system, of solving gigantic scientific, technical and production problems on the basis of the vital interests of all the people came to light especially vividly during the period of the Great Patriotic War and in the process of the postwar restoration of the national economy.

Much attention was devoted by the party to the questions of scientific and technical policy at all the subsequent stages of the development of the country. Important measures in this area were implemented in conformity with the decree of the July (1955) CPSU Central Committee Plenum "On the Tasks on the Further Development of Industry, Technical Progress and the Improvement of the Organization of Production." The assumptions and conclusions, which are contained in the documents of the 24th, 25th and 26th CPSU Congresses and the subsequent party Central Committee plenums, are of fundamental importance in the elaboration and implementation of the unified scientific and technical policy during the period of mature socialism. It is based on the experience of the past and contains many new features, which correspond to the current trends of the development of productive forces and socialist production relations.

The party is aiming personnel and all workers of production toward a high level of organization and systematicness in the implementation of scientific and technical programs. It is proceeding on the basis that not individual achievements of scientific and technology, as dazzling as they might be, but a high scientific and technical level of all production is important.

One of the complicated tasks consists in concentrating the mighty scientific and technical potential, which is available in the country, and the efforts of scientists, designers and process engineers on the practical solution of the fundamental problems of the intensification of the national economy, the development of the lagging sectors and units of production and the elimination of bottlenecks. Forces and assets are still distributed among an excessively large number of themes and developments, which frequently are of an exceptional nature and do not ensure great technical and economic changes. Inadequate attention is being devoted to the solution of comprehensive intersectorial scientific and technical problems. Departmentalism, regionalism, the lack of coordination of actions and bureaucracy frequently appear in case of the development and placement into production of advanced, highly efficient equipment, in a number of instances the proper responsibility of managers and economic personnel for the scientific and and technical level of production is absent.

As a result of this at some enterprises and in some sectors in recent years the updating of the machines, equipment and other items, which are being produced, has slowed, among the types of products, which are being newly assimilated by production, fundamentally new equipment and advanced materials, which conform to the task of the changeover to the intensive means of economic development, account for an inadequate share, the level of the mechanization and automation of labor is increasing slowly, advanced, fundamentally new technologies are being poorly introduced.

The formed economic mechanism and the practice of the planning, organization and stimulation of production for the present, unfortunately, are giving rise at enterprises and economic and scientific organizations to an orientation to a greater extent toward the increase of the gross, value volumes of production than toward the increase of the qualitative indicators and the acceleration of scientific and technical progress. It is well known that matters with the fulfillment of the plans on science and technology in many

sectors are going far from satisfactorily, but the assignments on the gross indicators are nevertheless being fulfilled.

Apparently, today it is already insufficient to formulate the plan on science and technology as a set of individual measures. The task is arising to combine fundamentally the planning of production, the development of science and technology and capital construction. Under present conditions the plans of production should at the same time also be plans of scientific and technical progress. While the plans of capital investments have to be turned into a means of the increase of the scale of the use in the national economy of the most advanced equipment and technology.

On the other hand, it is essential that the plans and programs of scientific and technical progress and the themes of scientific research and development would be drawn up in conformity with the real (current and future) needs of the national economy and that the necessary economic indicators of production would be provided.

The unified scientific and technical policy has its own specific structure and is divided into individual directions, units and stages.

It is possible to examine the structure of this policy in the functional, sectorial, territorial, time and other aspects. Apparently, from a practical point of view among the structural units of the unified scientific and technical policy it is expedient to distinguish the following ones.

1. The activity of the party, state and economic organs, enterprises and organizations, which has the goal to determine for the corresponding segment of time the basic directions of the development of science and technology, in order to concentrate forces and assets on them. The Comprehensive Program of the Scientific and Technical Progress of the USSR for the Future is called upon to play an important role in this matter. These directions are reflected in the versions being studied of the conception of the economic and social development of the country for the future and are incorporated in the Basic Directions of Economic and Social Development, which are examined and approved by the regular CPSU Congress. In conformity with them specific assignments are established in the state five-year and annual plans and in the scientific and technical and comprehensive goal programs.

2. The policy in the area of the development of science proper is the starting point of all the subsequent stages of scientific and technical progress. It is well known that much time passes, as rule, from the origination of a scientific idea to its extensive implementation in practice. Therefore the basic scientific and technical ideas, which are capable of determining the nature of production during the immediate planning period, should originate and receive engineering formulation considerably earlier, constant concern about the replenishment and enrichment of the scientific stock is required. The policy in the area of science encompasses a broad group of measures on the strengthening of the scientific potential as a whole and at the same time on the identification of priority scientific programs, the assurance of the optimum ratios between fundamental and applied sciences,

the development of a network of scientific research, planning, design and technological and experimental organizations and others.

Constant concern about the strengthening of the scientific potential is being displayed in our country. The expenditures on science in 1982 came to 24.6 billion rubles, while in 1970 they were 11.7 billion rubles, and in 1950--1 billion rubles. Thousands of scientific institutions, approximately 250 scientific production associations, 900 higher educational institutions and about 40,000 planning and design organizations and subdivisions are conducting research and development. More than 50,000 laboratories at industrial enterprises are also performing individual studies and developments. About 4.5 million people, including 1.43 million scientists and scientific teaching personnel, are employed in the sphere of science and scientific service. In the country there are 39,700 doctors and 423,000 candidates of sciences. An important task under present conditions is to increase the real contribution of all organizations and scientific personnel to the matter of increasing the efficiency of the national economy. The still existing unproductive laboratories and design bureaus and institutions, which are giving little assistance to the quickest possible intensification of production on a new, advanced scientific and technical basis, have to be completely eliminated from the system of scientific research and development.

3. The activity, which is aimed at the improvement of the mechanism of the use of scientific and technical achievements in the national economy and at the actual combination of science with production. In order to advance the matter of introducing new equipment and new methods of labor, it was indicated at the November (1982) CPSU Central Committee Plenum, it is necessary for central economic organs, the Academy of Sciences, the State Committee for Science and Technology and ministries not simply to promote them, but also to identify and eliminate the specific difficulties which are hindering scientific and technical progress. The methods of planning and the system of material stimulation should contribute to the combination of science and production. In party documents it is stressed that for the active realization of the integration of science and production it is necessary to increase the responsibility of managers of economic organizations for the technical and economic level of the works headed by them.

4. The unified policy on the development of technology. About 3,500 models of new types of machines, equipment, apparatus and instruments are developed annually in industry of the country. Of them on the average 2,800 descriptions a year are assimilated and begin to be produced in series. In addition to this, a large number of technical means are developed and produced by enterprises of various sectors for local needs and their own consumption. These processes should be precisely coordinated with each other and be based on a unified scientific and technical conception, in order to ensure the compatibility of the different components of the equipment. The development of the typification of technological processes and the standardization of parts, assemblies and units, the extensive use of modular structures of equipment and the principles of unitization and the formulation and introduction of long-term, leading standards, which guarantee in case of the placement of new equipment into production its real conformity to the highest world level, are of great importance on this level. The strict observance of

technological discipline, the requirements of technical specifications and the established schedules of operations and work serves as an essential condition of the achievement of the unity of technical policy.

5. The policy in the area of the training and further training of personnel in conformity with the requirements of scientific and technical progress. The personnel factor in the implementation of the unified scientific and technical policy is at the present stage, it can be said, of decisive importance. Success at all the stages of the process from research and development to the extensive dissemination of scientific and technical innovations depends precisely on people, on their knowledge, skill, ability and diligence. Therefore the party is devoting constant attention to the development of the system of education. In 1982 33.2 billion rubles were spent for these purposes as against 14.1 billion rubles in 1965. All the stages of education--from preschool and school education and vocational and technical training to education at higher educational institutions and the system of the further training of personnel--are important for the successful implementation of the scientific and technical policy. The reform of the general educational and vocational school, which was outlined by the party, is called upon to promote the cardinal improvement of the entire matter of the education of young people, their political, labor and moral training. Much has to be done in the area of the increase of the level of training of the personnel who are in the front line of the birth of new equipment--designers, process engineers and workers of pilot experimental works.

6. The policy in the area of the development of the international division of labor in the sphere of science and technology. Under the conditions of the rapid development of science and the complication of technology it is extremely difficult for each country individually to be ahead simultaneously in all the directions of scientific and technical progress. Therefore, our party is devoting much attention to cooperation in the scientific and technical area with all states which are interested in this. The importance of multilateral and bilateral cooperation between the fraternal socialist countries is especially great. The intensification of their scientific and technical integration is called upon today to oppose the malicious attempts of the reactionary forces of imperialism to hinder by various means the receipt of scientific and technical information and advanced equipment and technology from their countries by the socialist countries. These attempts are futile, since the CEMA member countries together have approximately a third of the scientific potential of the entire world. With the efficient organization of scientific and technical relations and the proper specialization in the development and production of equipment the socialist community is capable of achieving the highest levels in the world in all the decisive directions of scientific and technical development.

The Means of Accelerating the Progress of Science and Technology

The determination of the directions of the progress of science and technology, which are of paramount importance for the accomplishment of qualitative changes in productive forces and the changeover to the path of intensive development, is a fundamental task of scientific and technical policy.

In light of the prospects of the improvement of mature socialism our party is attaching exceptionally great importance to the forthcoming work on the development of machines, devices and technologies, which conform to the tasks of the present and future. When developing technological processes and designing and introducing new systems of tools of labor, it is necessary to see their place and role in the material and technical base of socialism and their conformity to the prospects of the building of communism. The distinctive attributes of advanced modern technologies are the small number of operations, continuity, the ability to provide a saving of materials, energy and manpower resources, chemicalization and the automation of the management of processes in accordance with the set mode.

Scientific and technical possibilities of the introduction of advanced technologies exist in practically every sector of production.

The changeover to a flexible technology and the designing and development of versatile automated works (GAP's) is an important direction of technical progress in industry. Their development and dissemination at the present stage are especially important in connection with the rapid obsolescence of the products being produced and the enlargement of the diversity of items which are required at the works and in the daily life. This is increasing the share of small-series and custom production, in which in case of the traditional approach the automation of production is almost impossible. Versatile automated works are changing cardinally work in this sphere, since the rapid changeover in automatic mode to the production of any new item of a given class is ensured. They are making it possible to make a substantial contribution to the solution of the now very urgent problem of the shortage of workers. According to the calculations of specialists, at enterprises of the future, which operate according to the concept of versatile automated works, the number of workers may be a hundredth as great as at existing enterprises.

The further development of research on the discovery of the laws of the composition of matter and the mastering of the means of the active formation of substances and materials with any preset properties are a strategically important direction of scientific and technical progress in the area of the objects of labor. The development and introduction of waste-free production processes require much attention. The USSR Energy Program for the Distant Future, which was adopted in the spring of 1983, is called upon to have a substantial influence on scientific and technical development in all the sectors of the national economy.

Enormous importance is being attached by the party to the scientific and technical problems which are being solved in connection with the USSR Food Program for the Period to 1990. Among them are the strengthening of the material and technical base of agriculture and the other sectors of the agroindustrial complex, the increase of the productivity of plant growing and animal husbandry and the development of highly efficient systems and sets of machines, which ensure the complete mechanization of basic and auxiliary operations.

The progress of science and technology, of course, should be based on the corresponding development of the production apparatus. Meanwhile in recent

times the tendency for the replacement of fixed production capital to slow down has been occurring. In industry the average annual coefficient of the retirement of fixed capital came during the 9th Five-Year Plan to 2 percent, during the 10th Five-Year Plan--1.7 percent and during 1981-1982--1.3 percent. Here the amounts of the placement of fixed capital into operation on the average are five- to sixfold greater than the amounts of retirement. Thus, the need for the acceleration of the updating of the production apparatus by the preferential development of such forms of it as the retooling and renovation of operating enterprises has acquired great importance in the structure of the scientific and technical policy for the future.

The policy of the party consists in using more completely the already accumulated enormous production potential and at the same time in improving investment policy and ensuring the increase of the share of the capital resources, which are being channeled into the replacement of the fixed capital of operating enterprises. Steps on the decrease of manual labor and the improvement of its content and conditions are envisaged.

Success in the implementation of the unified scientific and technical policy in many ways is governed by the effectiveness of the mechanism of combining science and production and the used forms and methods of the management of scientific and technical progress. Important measures are being implemented in this area in conformity with the instructions of the 26th party congress and the November (1982), June and December (1983) and February (1984) CPSU Central Committee plenums. They are based on the generalization of the advanced experience, which has been gained by many enterprises, associations and scientific organizations, and issue from the new, more complicated tasks which face the country.

As is known, since the beginning of this year an economic experiment on the broadening of the rights of production associations (enterprises) in planning and economic operations and on the increase of their responsibility for the end results of work has been conducted in a number of ministries. It is aimed at the creation of conditions which would stimulate more completely high quality labor, initiative, socialist enterprise and the intensification of production. Many hopes are also being placed in the experiment on the organization of the labor of designers and process engineers, which is being conducted in Leningrad and envisages the stimulation of the fulfillment of large amounts of work of better quality with a smaller number of performers. But now it is not enough simply to wait for the results of the experiments being conducted. The February (1984) CPSU Central Committee Plenum required of economic personnel that they display already now greater independence at all levels, boldly make a search and agree, if necessary, to risk for the purposes of the increase of the efficiency of the economy and the increase of the well-being of the people.

The party is making the appeal to step up the work on the improvement of the management of the economy and the entire economic mechanism. As the tasks of today are accomplished, the prerequisites should be created for the making of much greater gains in the future.

Now prime importance is being attached to the improvement of the planning of the development of science and technology. In conformity with the decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures on the Acceleration of Scientific and Technical Progress in the National Economy" (August 1983) the use of goal program planning is being expanded. Starting with the 12th Five-Year Plan a set of scientific and technical programs, which includes all-union, republic (interrepublic) and sectorial (intersectorial) programs, as well as scientific and technical programs of regions and territorial production complexes, will be formulated. The priority allocation of the necessary resources, as well as limits of capital investments and construction and installation work is envisaged for their implementation. It is important for these programs to be thoroughly substantiated and to promote major changes in the technical and economic level of the leading spheres and sections of the national economy.

Starting in 1985 a list of types of products of machine building, which are of fundamental importance for the entire national economy, will be specially distinguished when formulating the state plans of economic and social development. Differentiated standards of the periods of the updating (modernization) of the products of machine building are being introduced.

The fulfillment of the plans and assignments on the development of science and technology is being included among the most important indicators, in accordance with which first of all the results of the economic operations of production associations (enterprises) are evaluated and the results of the competition are also tallied.

Much attention is being devoted to the improvement of the cooperation of various departments and organizations in the implementation of the unified scientific and technical policy. The task to improve the scientific organizational and procedural supervision of the activity of ministries and departments on the acceleration of scientific and technical progress has been posed for the USSR State Committee for Science and Technology. Its possibilities as a coordinating organ are being broadened.

Additional work has to be performed for the development of the network of large production and scientific production associations and the concentration of the forces and assets of scientific research institutes and design bureaus on the accomplishment of key national economic tasks. For the purposes of the more complete and flexible use of the available scientific and technical potential, on the basis of the tasks of the unified scientific and technical policy, the practice of the organization of temporary scientific production subdivisions (complexes) for the most important national economic problems will be expanded. It is planned to implement important measures on the overcoming of the lag in the establishment and technical equipment of pilot bases and works and on the increase of the economic stimulation of the quickest possible development and assimilation of new highly efficient products, which are not inferior in their parameters to the best domestic and foreign models.

The implementation of the unified scientific and technical policy is a matter of all the people. Therefore the party is striving to create the most

favorable conditions for the development of the scientific and technical creativity of the broad masses of working people. In the country the number of inventors and efficiency experts and the importance of their contribution to the development of production are increasing. In 1982 the number of authors, who submitted efficiency proposals and applications for inventions, was 4.6 million as against 4 million on the average in a year during the 9th Five-Year Plan. The economic impact from the use of inventions and efficiency proposals increased accordingly from 3.9 billion rubles to 7 billion rubles.

In the further development of the initiative of the masses and in the organization of socialist competition under present conditions the party is concentrating the main attention on the qualitative indicators, which are connected with the intensification of production and the acceleration of scientific and technical progress.

The formulation and implementation of the unified scientific and technical policy is based on the extensive use of all the social motive forces of the socialist system: the collective nature of production, the systematic nature of its organization on the scale of the entire national economy, socialist competition, creativity and conscious labor discipline. The appearance of the social advantages of our system in the implementation of the unified scientific and technical policy is becoming more and more comprehensive in the course of the improvement of mature socialism. At the same time the process of the improvement of the scientific and technical policy itself is also occurring, its influence on the implementation of the plans of economic and cultural development is increasing.



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BANK OF ACHIEVEMENTS OF SCIENTIFIC, TECHNICAL PROGRESS

Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 4, Apr 84 pp 44-48

[Article by Candidate of Technical Sciences O. Starovoytenko: "Organizational and Economic Problems of the Management of Scientific and Technical Progress"]

[Text] The analysis of the measures on the improvement of the management of scientific and technical progress, which are being implemented on the all-union level, indicates that the organs of the state system of scientific and technical information are taking a more and more active part in the solution of the problems of the management of scientific and technical progress in the country.

In speaking about the increasing importance of the activity of the organs of scientific and technical information for the processes of the management of scientific and technical progress, it is impossible not to note that on both the all-union and especially the republic levels an integral organizational economic mechanism, which makes it possible to encompass completely the measures on the improvement of the management of scientific and technical progress--starting with the choice of the priority directions of scientific research, the "production" of the achievements of science and technology, the information reflection of these achievements and the management of their introduction in industrial production on a planned basis with allowance made for the requirements of quality and efficiency--is still absent.

Let us examine the approach to the solution of these problems on the republic level, which makes it possible to take into account the basic achievements and organizational measures in the management of scientific and technical progress on the all-union level.

It is advisable, in our opinion, to carry out the systems management of scientific and technical progress in a republic on such an organizational economic basis, which would ensure the combined accomplishment of the following tasks: the following at different levels of management of the latest achievements of science and technology both in the USSR and abroad, with allowance made for the tasks facing each specific economic object; the continuous evaluation and following of the scientific and technical level of industrial production with a breakdown by sector and territory;[1] the continuous checking of all innovations, their selection and analysis for introduction in production; the management of scientific research and

experimental design developments with allowance made for the achieved scientific and technical level from the point of view of the sector and territory; the management of the introduction of the achievements of science and technology in production, the changeover of this process to a planned basis.

The first three tasks can be accomplished by the reorganization of the existing mechanism of the functioning of scientific and technical information of the republic and its automated system (the ASNTI [automated system of scientific and technical information]) in the direction of the creation of a bank of achievements of scientific and technical progress (BDNTP). It is advisable, in our opinion, to accomplish the remaining tasks in the process of the development of the automated system of the management of the development of science and technology (RASUNT), of which the database of the bank of achievements of scientific and technical information should become the information basis.

On the organizational level the bank of achievements of scientific and technical progress should correspond to the structure of the organs of scientific and technical information of the republic and be a multilevel distributed data bank, the functioning and filling of which are based on the principles of the continuous evaluation of the scientific and technical level of industrial production with a breakdown by sector and territory, the checking of all innovations, their selection and analysis for introduction in production, as well as the regular exchange of information and the filling of local banks on the basic achievements of science and technology. For the effective implementation of the indicated principles one should distinguish four levels of the organization of the distributed bank of achievements of scientific and technical progress (the level of enterprises and associations, the territorial, sectorial and republic levels).

The Level of Enterprises and Associations of the Bank of Achievements of Scientific and Technical Progress. At this level it is necessary to form three arrays of initial data. The first is formed in case of the drawing up of the passport of enterprises and associations, which should contain the data on the availability and use of production capacities and on the organizational and technical level and the specialization of the specific works, as well as other technical and economic indicators, which are needed for the drawing up of five-year and annual plans. The second array of initial data should include information on the technical level of production, which has presently been achieved within the specific enterprise, and the organization of labor with respect to three sections: the world level; the level of authorship certificates in the USSR; the level of the most advanced enterprise in this matter in the sector or in related sectors as compared with the data of the third array. The third array should characterize the scientific and technical level of the specific works. For this, by analogy with the passports of enterprises and associations, it is necessary to draw up passports of the scientific and technical level of enterprises and associations or to insert the corresponding data in the already existing ones. Such passports should contain complete information on the technical level, which has been achieved at this enterprise, of all the tools of labor, the technological processes, as

well as the items which are being produced within the framework of scientific research work and experimental design work of the given specific enterprise.[2]

The examined arrays of data constitute the first level of the bank of achievements of scientific and technical progress. The information on new types of products, technology, equipment, tools and accessories and on advanced know-how, which is formed here and conforms to the achievements of the world or union level, at the same time should be transferred to the second (territorial) and third (sectorial) levels of the bank of achievements of scientific and technical progress. Data cards, which at present are being used widely, can serve as the storage devices of such data. The organization of the data representation of production processes by the indicated manner is, as will be shown below, the cardinal basis for the improvement of the technical and economic indicators of the activity of the enterprise (association) in all its spheres.

The Territorial and Sectorial Levels of the Bank of Achievements of Scientific and Technical Progress. The formation of the bank of achievements of scientific and technical progress at these levels should be carried out on such organizational economic bases, which would make it possible to ensure subsequently the effective combination of the territorial and sectorial principles in the management of scientific and technical progress. Such a combination is possible only on the basis of the establishment of the optimum ratio in the activity of information organs of the territorial and sectorial levels on the reflection of the achievements of science and technology. However, for the present there is no clear interaction between these organs, coordination in their development is also lacking.

Territorial organs, being closer to the works, know better the bottlenecks of production and the tasks facing it, although they do not have at their disposal a significant number of specialists in the highly specialized directions of the development of industry.[3] Therefore they are not able to actively influence the development of sectorial science, while sectorial organs, in turn, are to no extent interested in the development of the information activity of territorial organs. This is a serious problem, and its can be successfully solved only under the conditions of the continuous functioning of the bank of achievements of scientific and technical progress at all four levels. For this, first of all, it is necessary to ensure the two-way circulation of information on the latest achievements of science and technology between the first, second and third, as well as the second, third and fourth levels of the bank of achievements of scientific and tecnnical progress. Arrays of initial data on the latest achievements at the level of enterprises and associations are formed in case of the transfer of information from the first to the second and third levels of the bank of achievements of scientific and technical progress at the territorial and sectorial levels.

At the second level of the bank of achievements of scientific and technical progress this information will serve as the basis for the dissemination of advanced know-how among the enterprises of the given territory, regardless of their departmental affiliation, and also as the initial database for the evaluation of the scientific and technical level of industrial production of territories. At the third level it will become the basis for the

dissemination of advanced know-how among the enterprises of the given sector and the initial database for the evaluation of its scientific and technical level. It is necessary to constantly transfer the array of data, which is formed at the sectorial level of the bank of achievements of scientific and technical progress and in which the information on scientific and technical achievements in the sector, as well as on the achievements of world science with respect to sectorial specialization should be stored, to the first and second levels of the bank of achievements of scientific and technical progress.

The transfer of information on the latest achievements from the third to the first level of the bank of achievements of scientific and technical progress is a necessary condition of the increase of the scientific and technical level of industrial production of the enterprises of the sector and is included in the sphere of direct interest of the sectors. Along with the transfer of data cards from the third to the first level, it is advisable, in our opinion, at the same time also to transfer duplicates of the data cards to the level of the territories, on which the enterprises of the given sector are located, which will serve as the basis for the dissemination of the achievements of the sector at the level of the region, regardless of the departmental affiliation of the individual enterprises. The problem of the assurance of the active influence of the achievements of sectorial science on the development of the scientific and technical potential of territories and the reverse influence of tne scientific and technical potential of territories on the development of sectorial science arise at precisely this stage of the exchange of information on achievements between the second and third levels of the bank of achievements of scientific and technical progress. This problem can be successfully solved in case of the direct economic interest of the territories and sectors in information exchange, and, moreover, its solution to a significant degree depends on the level of the organization of the activity of the territorial information organs. For these purposes at the second level of the bank of achievements of scientific and technical progress it is advisable to form arrays of data on each sector, which the information from the first and third levels of the bank of achievements of scientific and technical progress of the specific sector should enter. The generalization at the second level of the bank of achievements of scientific and technical progress of the scientific and technical achievements of a specific sector and the transfer of this information to the first and third levels of the bank of achievements of scientific and technical progress of sector i will also serve as the economic mechanism, which ensures the active combination of the territorial and sectorial exchanges of scientific and technical achievements. Here each sector receives data on the achievements in other sectors through the organs of scientific and technical information, that is, the creation of the bank of achievements of scientific and technical progress requires the urgent intensification of the activity of the latter.

The Republic Level of the Bank of Achievements of Scientific and Technical Progress. The problems of the creation of arrays of data on the most important achievements of science and technology at the world, union and sectorial levels, by the sorting of all the data cards on the achievements which exist at these levels, as well as the problem of the constant filling of the second and third levels of the bank of achievements of scientific and

technical progress with the necessary information, with allowance made, of course, for the territorial and sectorial specialization of works, should be solved at the fourth level of the bank of achievements of scientific and technical progress. The elaboration of the methodological bases of the functioning of the distributed bank of achievements of scientific and technical progress, the classification of the subject areas and the organization of the arrays of achievements of scientific and technical progress and so on also acquire substantial importance at this level.

At the present stage of the development of the economy the following of the scientific and technical level of industrial production is the most important task of the improvement of the management of scientific and technical progress. The creation of the bank of achievements of scientific and technical progress affords a number of new, additional opportunities in the area of the systems management of scientific and technical progress at different levels of the national economy.

1. The following of the scientific and technical level of industrial production will make it possible to form arrays of data on the scientific and technical level of a specific economic object. Such information will afford opportunities for the organization of the systematic increase of the scientific and technical level, which, in turn, will place the process of introducing the achievements of science and technology in industrial production for the purposes of the achievement of the desired scientific and technical level on a planned basis. The need for the achievement of the desired technical level increases the demands on the selection of the technical decisions being introduced, speeds up the process of the replacement of fixed production capital and is a hindrance for the output of obsolete products. At the same time the systematic increase of the scientific and technical level with a breakdown by territory and sector serves as a natural stimulant of the acceleration of the processes of the development and assimilation of new equipment, that is, the shortening of the duration of the cycle of the introduction of scientific and technical achievements in production.

2. On the basis of these data it will the possible to increase purposefully and systematically the quality of the items being produced, since the scientific and technical level of enterprises and associations is inseparably connected with the quality of the output being produced.

3. The data on the scientific and technical level of industrial production will facilitate the monitoring of the technical level of the machines, equipment and other machinery, which are being produced, and the making of an extradepartmental appraisal of the technical and economic indicators of the items, which are already being produced and are being assimilated.

4. The polarization of the data on the latest achievements in the area of science, engineering and technology, on new types of products and so forth will make it possible at the same time to form a list of the priority scientific and technical problems in various areas of economics. These data will make it possible to pursue a purposeful policy with respect to the formation of scientific and technical priorities in the development of some

economic objects or others and will afford new opportunities for the use of the results of science and technology when accomplishing priority economic and social tasks. At the same time these data will serve as the basis for the formulation at the territorial and sectorial levels of comprehensive goal programs, as well as a database for the making of decisions on their implementation.

5. The purposeful exchange of data within the bank of achievements of scientific and technical progress will make it possible to speed up the process of the exchange of data on scientific and technical achievements in the territorial-sectorial context and to improve of the management of scientific and technical progress.

6. The systematic, consistent increase of the scientific and technical level of industrial production on the basis of the latest equipment and technology, by means of the functioning of the bank of achievements of scientific and technical progress will make it possible to reflect in the plan indicators the effectiveness of the planned measures on scientific and technical progress and the improvement of the management of the national economic at different levels.

7. The following of the scientific and technical level of industrial production not only will afford new opportunities in the matter of improving the management of scientific and technical progress in the republic, but will also improve the quality of the solution of a number of old problems in the activity of the system of scientific and technical information: here the orientation of the themes of information support with respect to the solution of basic national economic problems with allowance made for their territorial and sectorial aspects will be increased, and a specific database for the choice of the themes of the informational interpretation of the priority problems of scientific and production activity will also appear.

It is obvious that the creation of the bank of achievements of scientific and technical progress in the organs of scientific and technical information is one of the aspects of the solution of the problem of improving the system of scientific and technical information and patent and license work, the need for which was discussed in the Basic Directions of USSR Economic and Social Development for 1981-1985 and the Period to 1990. However, the creation of the bank of achievements of scientific and technical progress in the structure of the organs of scientific and technical information not only will make it possible to solve the indicated problems, but will also create the necessary conditions for the further development of the management of science in our republic.

As is known, the further improvement of the management of scientific and technical progress in the Ukrainian SSR is being carried out in conformity with the decree of the Central Committee of the Communist Party of the Ukraine and the Ukrainian SSR Council of Ministers "On Some Measures on the Further Improvement of the Management of Scientific and Technical Progress in the Republic" (1977).

The development of the bank of achievements of scientific and technical progress will enable ministries and departments to have a database for the making of specific decisions on the accomplishment of a wide range of problems, which are connected with the increase of the technical and economic level of production, the acceleration of the introduction of the achievements of science and technology in industrial production and the assurance of the extensive dissemination of these achievements, and is a necessary condition of the successful fulfillment of this decree.

We should dwell specially on the role of the bank of achievements of scientific and technical progress in the development of the Republic Automated System of the Management of the Development of Science and Technology (RASUNT) which includes at present the following blocks: "The Forecasting of the Scientific and Technical Potential" (ASPP [automated system for applied programs]), "Planning Calculations on Science and Technology" (ASPR-NT [automated system of planning calculations--science and technology]), "The Management of Scientific and Technical Programs" (ASUPr [expansion unknown]), "The Center for the Exchange of Current Information" (TsOTI), as well as "The Planning and Organization of the Introduction of Automated Control Systems and Computer Equipment" (ASUVT-NT [automated control system of computer equipment--science and technology]).[4] The analysis of the problems, which are to be solved in the indicated blocks, shows that the data on the scientific and technical level of industrial production with a breakdown by sector and territory will make it possible to plan sounder decisions on the management of science at the stages of forecasting, planning, accounting and monitoring, operational management and the determination of the efficiency.

For the stage of scientific and technical forecasting the initial database for the determination of the priority directions in scientific research and development and the list of the most important scientific and technical programs and the goals of scientific research and development, as well as other information, which is necessary for the accomplishment of the tasks on the forecasting of the scientific and technical potential of the block of the automated system for applied programs, are formed in the bank of achievements of scientific and technical progress.

For the stage of planning the bank of achievements of scientific and technical progress can, in our opinion, put together the initial data for the determination of the basic directions of scientific and technical progress and the most important scientific and technical problems, which require solution during the planning period, with a breakdown by territory, sector and republic, the data for the elaboration of programs and plans on the implementation of the basic directions of scientific and technical progress with allowance made for the achievements of world and Soviet science, as well as plans of the financing of scientific research work and other data, which are necessary when accomplishing the tasks of the block of the automated system of planning calculations--science and technology.

As for the role of the bank of achievements of scientific and technical progress in the implementation of the functions of accounting and monitoring, operational management and the determination of the efficiency of the process of the management of science and technology, it is clear from what has been

said. Let us merely note that the accomplishment of a number of tasks (see paragraphs 1-7), which are connected with these functions, is carried out in such subsystems of the Republic Automated System of the Management of the Development of Science and Technology as the ASUPr and the Center for the Exchange of Current Information. Here the database of the bank of achievements of scientific and technical progress at the same time is also the data base of the Center for the Exchange of Current Information.

Thus, the creation of the bank of achievements of scientific and technical progress in the structure of the organs of scientific and technical information will make it possible to combine the processes of the following of the scientific and technical level of industrial production with the accomplishment of a significant portion of the tasks on the management of the development of science and technology, which is being carried out at the middle level of the Automated System of the Management of the Development of Science and Technology.[5] At the same time the integration of the automated system for scientific and technical information in the area of the bank of achievements of scientific and technical progress with the Republic Automated System of the Management of the Development of Science and Technology will make it possible to combine a number of tasks of the second and third stages of the development of the Automated System of the Management of the Development of Science and Technology on the integrated processing of scientific and technical information and technical and economic information, on the uniting of data arrays of these systems and so on. Moreover, the integration of the automated system for scientific and technical information and the Republic Automated System of the Management of the Development of Science and Technology simplifies the management of all the stages of the cycle "science--technology--production--consumption"

In this connection in the integral conception of the development of the Republic Automated System for the Collection and Processing of Information for Accounting, Planning and the Management of the National Economy of the Ukrainian SSR the fundamental merging of the intersectorial system of scientific and technical information (the automated system for scientific and technical information) and the Republic Automated System of the Management of the Development of Science and Technology at different levels of the management of the development of the national economy is urgently required. Such a merging will make it possible to distinguish in the structure of the economy of our republic the organizational and economic structure (the organs of scientific and technical information), which will be able to ensure the preparation of information for the systems management of the process of transforming science into an immediate productive force of mature socialist society.

FOOTNOTES

1. The scientific and technical level of industrial production can be evaluated from different standpoints. Thus, for example, the ratio of the volume of output with the Emblem of Quality, which is produced by the enterprise, the sector and the territory, to the total volume of output, which is produced by these objects, is one of the possible indicators of

their scientific and technical level. The integral evaluation of these parameters at the republic level will become an indicator of the scientific and technical level of the republic and so on. However, it is advisable, in our opinion, to evaluate the scientific and technical level of industrial production as the ratio of the volume of output, which conforms to the world level, to the total volume of output, which is produced by a specific enterprise. Here the final product of production should undergo the corresponding certification with respect to the world and union levels, with allowance made for the requirements of quality, the achieved level of inventions in this area and authorship certificates. This makes it possible to pursue a purposeful policy in the choice of the priority directions of the development of scientific and technical progress, taking into account at the same time the possible amounts of financing of scientific research work and experimental design work at the specific enterprise.

2. Experience in the organization of arrays of this kind exists in both our country and several CEMA member countries (See N. I. Yermakov, "The Information Support of the Control of the Scientific and Technical Level of Items in the Scientific Production Association. Scientific and Technical Information. Series 1," ORGANIZATSIYA I METODIKA INFORMATSIONNOY DEYATEL'NOSTI, No 8, 1979, p 14; L. Weinrich, "The System of Scientific and Technical Information at the Robotron Combine," ZARUBEZHNAYA RADIOTEKHNIKA, No 12, 1981, pp 68-73).

3. See N. B. Arutyunov, "The Role of Sectorial Systems in the State System of Scientific and Technical Information. Scientific and Technical Information. Series 2," INFORMATSIONNYYE PROTSESSY I SYSTEMY, No 7, 1978, pp 1-10.

4. See V. P. Shevchenko, "A Structural Description of the Functional Part of the Republic Automated System of the Management of the Development of Science and Technology of the Ukrainian SSR," MEKHANIZATSIYA I AVTOMATIZATSIYA UPRAVLENIYA, No 2, 1980, pp 29-32.

5. See V. I. Maksimenko, "Some Questions of the Development of the Automated System of the Management of the Development of Science and Technology," MEKHANIZATSIYA I AVTOMATIZATSIYA UPRAVLENIYA, No 2, 1980, pp 11-13.



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AWARDING OF NOBEL PRIZES EXAMINED

Moscow TEKHNIKA I NAUKA in Russian No 6, Jun 84 pp 28-31

[Article by radio engineer Yu. Baranov, chemist L. Bobrov and literary critic P. Tataurov: "The Awarding of Nobel Prizes: Where Is the Logic?"]

[Text] Such a statement of the question is not by chance. We are submitting it to the judgment of the readers after lengthy meditation and discussions. Indeed, why has the contribution of our people to the world treasure of spiritual culture been so unjustly rarely commended by these prizes? They did not deign to award them, for example, to the greatest chemist of the world, D. I. Mendeleyev, and "the Mendeleyev of biology" N. I. Vavilov, A. S. Popov, the inventor of radio, and P. N. Lebedev, the virtuoso of the physics experiment, B. B. Golitsyn, the founder of seismology, and N. S. Kurnakov, the creator of physical chemical analysis, "the father of heliobiology" A. L. Chizhevskiy and V. I. Vernadskiy, the founder of the science of the biosphere. It is easy to continue the list.

Prior to 1917 they presented this award, with which they have honored achievements in the area of physics, chemistry, physiology and medicine since 1901, to only two of our fellow countrymen--I. P. Pavlov in 1904 and I. I. Mechnikov in 1908.

After Great October these and other fields of the natural sciences developed rapidly and fruitfully in our country. Now almost 300 descriptions of works, which are outstanding in their importance, are in the USSR Register of Discoveries. And more than a million inventions are registered. But among the Soviet people there are only 10 Nobel Prize winners. But why are there so disproportionately few for a country, in which one out of four scientists of the world lives and in which a mighty "industry of ideas," which provides nearly a third of the world scientific output and a fifth of all the technical solutions, which are registered annually on earth, has been developed?

Without aspiring to any complete independent answer (we ourselves are awaiting it from science scholars), let us confine ourselves merely to brief, but eloquent information for thought.

## An Inveterate Tradition

"In the West the disregard or underestimation of the activity of scientists and inventors of our country has become a kind of bad tradition," Professor V. S. Virginskiy, a historian of science and technology, testified in 1957. The tradition is really bad and, moreover, inveterate.

"The West continues to look at everything Russian with a significant portion of suspicion," about 100 years ago Professor V. V. Markovnikov, a worthy representative of the Russian chemical school, which by that time had moved into first place in the world owing to the epoch-making achievements of D. I. Mendeleyev (the Periodic Law), A. M. Butlerov (the theory of chemical structure) and other Russian naturalists, said indignantly. Leading scientists of the West were well aware of this, but certain circles stubbornly "did not notice" this progress and in defiance of self-evident facts obstinately denied the high level, and all the more so the superiority of their Russian colleagues.

Things were carried to the point of absurdity. Thus, when considering the candidates for the 1906 prize in chemistry in Stockholm they began to argue: To whom should preference be given--Mendeleyev or Moissan? By a majority of one vote they decided: to Moissan. Perhaps, you will not find fault: everything seems to be "entirely democratic." But is this sorry democratism not ridiculous? Incomparable contributions to science were compared with musical comedy seriousness, as if they were all but identical in ponderability!

Of course, Henri Moissan was the first to isolate fluorine and study its properties. But all this, undoubtedly, pales before the contribution of Mendeleyev, especially the main one: the Periodic Law became the heart of the science of matter and atoms. Mendeleyev while still alive won not only all-Russian, but also all-European, if not world fame! Dmitriy Ivanovich had more than 130 honorary titles and diplomas from domestic and foreign scientific societies, educational institutions and academies. The scale of his merits, and he, without exaggeration, was the founder of all modern chemistry and in many ways of physics, especially nuclear physics, had already been clearly outlined at the dawn of the 20th century.

But at the beginning of the century figures of obviously less caliber received the Nobel Prizes in chemistry: in 1901 Netherlander Jacobus van't Hoff (for the discovery of the laws of chemical dynamics and osmotic pressure), in 1903 Swede Svante Arrhenius (for the development of the theory of electrolytic dissociation), in 1904 Englishman William Ramsay (for the discovery of inert gases and the determination of their position in the periodic table), in 1906 the already mentioned Frenchman Henri Moissan.

And if anyone (assume the same Moissan or Ramsay) were to have received it with Mendeleyev! No. But in 1907 Dmitriy Ivanovich passed away. They crown someone with the Nobel laurels only during one's lifetime. And that is why in 1909 Italian Guglielmo Marconi shared them not with Russian A. S. Popov, but with German Karl Braun. Aleksandr Stepanovich died in 1906. As a result Braun and Marconi found themselves in the Stockholm annals (and from there

also in the encyclopedias of the West) as the pioneers of wireless telegraphy without our Popov, whose invention back in the late 19th century became well known even on the North American continent.

A thorny path in Stockholm was also in store, probably, for the candidacy of P. N. Lebedev, who by exquisite experiments was the first to demonstrate the pressure of light (along with millimeter "Lebedev waves" these brilliant observations have entered textbooks as an absolute classic of physics). But in 1912 Petr Nikolayevich died. Science had lost "a brilliant physicist, who had mastered the art of experimentation, as hardly anyone else in our times," well-known Professor Wilhelm Wien (Germany), the 1911 Nobel Prize winner, mourned in his condolence.

Meanwhile fame struck in Stockholm first German Phillip Lenard--in 1905 (for the study of cathode rays), then American Albert Michelson--in 1907 (for arrangements of precision optical instruments), then Frenchman Gabriel Lippmann--in 1908 (for a new technique of color photography), then Swede Nils Dalen--in 1912 (for the automation of the lighting of signal lights in buoys).

But why again not the Russian B. B. Golitsyn (1862-1916)? One of the most prominent geophysicists, he was a member of the London Royal Society and a number of other academies and president of the International Seismic Association. Boris Borisovich is recognized by all as "the father of seismology." He was the first to design an electrodynamic seismograph, which was adopted in our country and abroad--the prototype of current seismographs. He solved the important problems of the search for the epicenter of an earthquake according to the data of one seismic station; the determination of the speed of the propagation of oscillations of the earth's solid at different depths. He proposed to "probe" seismometrically the interior of the planet and identified in the depths, which are unattainable for drilling, a peculiar spherical shell ("the Golitsyn layer"). Such probing, which lights up the structure and composition of rock, is exceptionally valuable for geophysics, geology and the prospecting of minerals.

These and many other works, which were fulfilled by domestic scientists, enriched mankind with "diamond placers and goal veins" of ideas. But in Stockholm they as if did not suspect this and did not bestow favor on our fellow countrymen, be it A. M. Zaytsev (1841-1901), N. A. Umov (1846-1915), L. A. Chugayev (1873-1922) and other luminaries of science--the readers themselves can continue the list.

The "logic" of the Nobel Committee at times is such that it dumbfounds. The "father of chemical weapons" Fritz Haber (Germany), one of the war criminals who was subject to extradition by the request of several powers, was its 1917 choice. Germany in 1915-1917 was the first to use lethal mustard gas and chlorine gas against people. Meanwhile, in 1917 N. D. Zelenskiy (1861-1953) invented the first dry filtering gas mask with activated carbon and a rubber mask in the world, which prevented the death of thousands and thousands of people who fought at the fronts of World War I. But Nikolay Dmitriyevich never lived to see the Nobel award, although as an organic chemist he did no less than its winners of various years: German Heinrich Wieland (1927), Swede Hans Euler-Chelpin (1929) or Finn Artturi Virtanen (1945).

"Myopia" Complicated by "Color Blindness"

During 1901-1983 358 people became the holders of the Nobel Prize (a medal, a diploma and a check for up to $70,000). Including 132 in the United States, 60 in England, 49 in Germany (after 1949 the GDR and the FRG), 22 in France, 14 in Sweden, 10 in Switzerland, 10 in Russia and the USSR, 9 in the Netherlands, 8 in Austria and so on.

The patent West European-North American tilt is conspicuous. The reasons? Science scholars still have to investigate them thoroughly. It seems that not the last of them is "Atlantocentric arrogance" (see the article "Slander by Keeping Silent," TEKHNIKA I NAUKA, No 11, 1983). The West is teeming with proud philistines, for whom it is a certain "hub of the universe"; while other "geographic concepts" are on the second, third and even more remote levels. This voluntary or involuntary arrogance for a long time has been developing into harmful "myopia" in Stockholm (and not only there). While for some time "Daltonism," which interferes with the distinction of the successes of "red," first of all the Soviet people, has complicated it.

The syndrome, about which Academician A. A. Ukhtomskiy spoke, "both the traditional haughtiness of Western scientists with respect to Russians and deliberate prejudice against the USSR," is present. Many members of the Nobel Committee and their associates, in all likelihood, suffer from this two-in-one "disease."

Judge for yourself. Swiss Charles Guillaume, who discovered several anomalies in alloyed steels and obtained invar and other alloys, which are necessary in the production of precision instruments and metrological standards, received the 1920 prize in Stockholm. So, the services are impressive. But are they really less for our N. S. Kurnakov (1860-1941), who never became, however, a Nobel Prize winner? Back at the beginning of the 20th century Nikolay Semenovich developed the physical chemical analysis of alloys, solutions and other similar systems--a mathematically strict method of their study by means of Kurnakovian "composition-property" diagrams. Kurnakov added new pages and an entire chapter to the history of metallography. This is not everything, but this alone is already, probably, far more than the contribution of Guillaume.

And what about V. I. Vernadskiy (1863-1945)? "The most prominent mineralogist of the world," "the greatest of geochemists." That is what they called Vladimir Ivanovich, while remembering: nearly all Soviet and many foreign mineralogists and geochemists are his students. But such laconic descriptions are rather narrow for an all-round scientist, to whom there are no equals in our century in the diversity of areas in the field of knowledge, in which he plowed, so to speak, deep furrows, frequently through unplowed virgin land. However, he is famous not only for the broad coverage of different directions--from meteoritics and space chemistry to soil science, from geography and history to philosophy. Vernadskiy is the founder of radio geology, geochemistry, biogeochemistry, the science of the biosphere and other disciplines. A brilliant naturalist and thinker, he was the first to pose such problems, the importance of which has been widely realized only in our

times. These are, for example, the importance of radioactive substances and nuclear energy, the fate of civilization in the area of rapid progress in all areas of human activity and others.

Prominent English botanist John Hutchinson stressed: the conception of the biosphere, which is now generally accepted, "is based mainly on the ideas of Vernadskiy." When the Soviet scientist presented them 60 years ago to French colleagues and students of the Sorbonne in a series of lectures, these views were enthusiastically greeted and taken up by western researchers.

Vernadskiy had already thought and written about the unity of space and time 20 years before Einstein (in 1885). Moreover, he refuted the common opinion that the universe is the realm of mirror symmetry. Vernadskiy spoke penetratingly half a century ago about its persistent disturbances and about the distinctions of "right" and "left" in the microcosm. He warned: "Space-time is thoroughly nonuniform, and phenomena of symmetry can appear in it only in limited areas." Prophetic words! One of the confirmations is "the nonconservation of parity," which was discovered by U.S. physicists only in 1956-1957. The reaction in Stockholm? Quick as lightning: the 1957 Nobel Prize to the Americans. But there they did not respond in any way to the basic conclusions of Vernadskiy.

It is possible to name all the new pioneering achievements of our authors, which in Stockholm for some reason "were not noticed" in good time.

I. V. Kurchatov (1903-1960). Together with collaborators he discovered a new type of radioactivity, nuclear isomerism, and proved the possibility of a chain reaction in a system with uranium and heavy water. Under the supervision of Igor' Vasil'yevich G. N. Flerov and K. A. Petrzhak identified a hitherto unknown phenomenon--the spontaneous decay of the nuclei of uranium.

S. S. Bryukhonenko (1890-1960). He developed the first artificial blood circulating device in the world (on the basis of his own method), which he used for reanimation. The resuscitation of the human body "a la Bryukhonenko" began back in the 1940's. Physiologists and medical people are obliged for progress in this important area to Sergey Sergeyevich Bryukhonenko no less than to other Nobel Prize winners. Let us say Frenchman Alexis Carrel, the designer of the "perfusion pump" (the supply of an isolated organ with blood and oxygen was maintained by it).

But what about the "father of heliobiology," A. L. Chizhevskiy (1897-1964)? In 1939 the First International Congress of Biophysicists in New York elected him not without purpose as its honorary president. "In nominating A. L. Chizhevskiy for the Nobel Prize, the congress noted that the multifaceted scientific, literary and artistic activity of the scientist gives grounds to characterize him 'as the Leonardo da Vinci of the 20th century'," USSR pilot and cosmonaut V. I. Sevat'yanov recalls. "And, indeed, the range of interests of A. L. Chizhevskiy was extremely diverse. The services of Aleksandr Leonidovich to space biology are especially great."

But in Stockholm they obviously were in a hurry to honor (1960) the very questionable contribution of American Willard Libby to archaeology (see "This

Strange Radioactive Carbon Method," TEKHNIKA I NAUKA, No 8, 1983). And at the same time they ignored the truly outstanding, world-class achievements of our natural science. An example is the discovery of electron paramagnetic resonance by Soviet physicist Ye. K. Zavoyskiy (1907-1976) in 1944. The method of electron paramagnetic resonance has shown itself to advantage in various spheres of its application. Yevgeniy Konstantinovich also discovered ferromagnetic resonance (1947), but....

In 1970 for basic work in magnetism they granted the Nobel award to Frenchman Louis Neel.

It is possible to draw new parallels in the same spirit, if it is not yet clear that by no means chance, but natural "oversights" in Stockholm are behind them. For greater persuasiveness let us turn to bounds far from science--the picture will be surprisingly similar.

"I Did Not Notice That Elephant..."

When they awarded the very first of the Nobel Prizes in literature to French symbolist poet Sully-Prudhomme (1901), Selma Lagerlof, August Strindberg and 40 other prominent Swedish authors sent Lev' Tolstoy an address, in which they expressed their bewilderment and indignation with such an unexpected and unfair decision, which was made in defiance of world public opinion.

Whom in Europe was it possible to place next to Tolstoy? No one, V. I. Lenin believed.

"First place among modern writers belongs to Tolstoy," Danish critic Georg Brandes recalled, qualifying Sully-Prudhomme as "an ingenious, but second-rate poet." "We should all learn from Count Tolstoy," Maupassant had said. Anatole France and Romain Rolland, Bernard Shaw and Thomas Mann, the Nobel Prize winners of 1915-1929, echoed him. In 1937 Roger Martin du Gard devoted a large part of his Nobel speech to "the Great Teacher." "Tolstoy will be regarded by posterity on the same level as Shakespeare," presumed John Galsworthy, who called "Voyna i mir" War and Peace "the greatest thing of everything written." And not that long ago Andre Maurois, in comparing Homer, Shakespeare, Balzac and Tolstoy, could not be single out "the greatest of the great"--the Russian artist and thinker.

In the questionnaires on the theme "Tolstoy and We" (his influence on the minds and spirits of entire generations) some fiction writers stressed the total incomparability of their talent with the genius of this giant. Richard Aldington: "In comparison with such a writer and person as Tolstoy I am nothing."

Strindberg attacked in print the Swedish Academy: he said, the majority of its members, who are involved in the selection of candidates, are "unscrupulous hacks and dilettantes in literature," who "do not understand art, while undertaking to judge it." As for ignorance, Strindberg, perhaps, lost his temper, but concerning unscrupulousness.... In any case, the prejudice is beyond doubt.

During 1901-1983 80 Nobel Prize winners in literature were assembled, including 12 in France, 10 in the United States, 8 in England, 7 in Sweden, 6 in Germany (after 1949 the GDR and the FRG), 5 in Italy and so on.

But how long did they take with the rewarding of Mikhail Sholokhov? Tens of years--until 1965. For his name was mentioned to the Swedish Academy by western connoisseurs, who are respected by it, in the press of Paris and London, Copenhagen and Stockholm back in the early 1930's. At that time they were comparing "Tikhiy Don" The Quiet Don , which had been published in many countries, with "Voyna i mir."

After World War II Louis Aragon (France) and James Aldridge (England), Arthur Lindkvist and Ivar (Lu-Juhansson) (Sweden) and many others called Sholokhov the first of the Nobel Prize candidates. But the Swedish Academy as if had not heard of "the triumph of Sholokhov and Soviet literature" and of "the best novel of the century," as Scandinavian newspapers wrote back in the 1930's. "'Tikhiy Don' is a fantastic work with respect to talent," critic (Stieg Carlson) recalled once more in the Swedish (MORGON TIDNINGEN) (23 February 1958). Owing to the epic canvas of Sholokhov Soviet prose "has taken first place in modern romance," Academician Bratko Kreft (Yugoslavia) stated.

Meanwhile, Nobel Prizes were awarded to anyone you like, only not Sholokhov. For example, in 1953 to the mediocre writer (who had scribbled a single, moreover weak, artistic opus), author of memoirs and amateur historian Winston Churchill, the famous initiator of the Cold War and then Prime Minister of England.

Sholokhov did receive the Nobel Prize. Indeed, this outcome is especially gratifying, as the anti-Soviets attempted to stand in his way literally to the final days. Thus, in the fall of 1965 Jorge Luis Borges, director of the National Library of Argentina, hastily flew to the FRG and there "in various circles took all steps for political pressure on the Swedish Academy, so that they would in no case award the Nobel Prize to Sholokhov," Rodolfo (Gioldi), a member of the Executive Committee of the Communist Party of Argentina, testified. Obviously, the pressure of the anticommunists was and remained a real force in Stockholm. Into who else's head would it come to set out on long and expensive trips for the sake of intrigue?

Undoubtedly, the criteria in such a delicate matter as the evaluation of the contribution of scientists to world science should be as objective as possible. Here, probably, it is in no way possible to confine oneself to the indicators of quotation, which are in wide circulation in the West: the more references there are to one work or another, the more appreciable, they say, its influence is.

By better evaluating and popularizing the significance of our contribution to the human fund of culture, the science of science would help us, engineers, journalists, scientists and all true patriots, to expose the prejudice in the awarding of the prizes, which are of such prestige in the West, as the Nobel Prizes. It is no secret: many people judge from the number of them, which a given country has, the quality of its creative, intellectual potential. Is it

not time to shatter this harmful myth, which anti-Soviet propaganda is zealously exaggerating? Is it not time to declare war on the bad tradition--the continuing attempts to gloss over and belittle the role of our people in the development of culture?

From the Editorial Office

The problems, which are raised by the authors of the article, force us to look in a new way at the Nobel Prizes, which during the eight decades of their existence have turned from an ordinary award, of which sort there were many at the end of the past century, into a certain benefit of the scientific Olympus. It was believed that the Nobel Prizes were obligated for such a lofty reputation to the wisdom of the Swedish Academy of Sciences, Carolina University, the Academy in Stockholm and the committee of the Norwegian Storting, which, they say, have followed strictly the will of Alfred Nobel (1833-1896). As is known, this Swedish millionaire, in establishing his own awards, dreamed that "when awarding the prizes the nationality of the candidates would not be taken into account, the most worthy ones would receive the prizes." However, in reality the secret of the turning of the second-rate prize into the most honored scientific award lies in something else.

The Nobel Prizes with their widely claimed reputation of ostensibly absolute objectivity in the evaluation of scientific services proved to be a real find for western propaganda, which is waging an ideological struggle against the USSR and the socialist countries. Immediately after the end of World War II there appeared in the American press numerous articles, in which attempts were made to assess the scientific potential of various countries according to the number of Nobel Prize winners. The goal of these calculations was clear: since in the USSR there is not one Nobel Prize winner, it will never develop nuclear weapons, which were developed in the United States by a team of "highbrow" representatives of western science. And not by chance starting precisely in the late 1940's did the mass media of the West begin to laud excessively and promote extensively the Nobel Prizes. Unfortunately, both here and there in our country and in our press they gave in to this epidemic, alas, references to Nobel Prize winners are encountered much more often than references to the winners of the prizes, which our Academy of Sciences awards for scientific discoveries. And there are many such examples.

Thus, since 1956 the Lomonosov Prize has been awarded to physicists, including foreign physicists. Since 1936 the USSR Academy of Sciences has give the D. I. Mendeleyev Prize, since 1940--the K. A. Timiryazev Prize, since 1942--the S. A. Chaplygin Prize, since 1943--the P. L. Chebyshev Prize and since 1959--the A. S. Popov Prize. Moreover, there are the academic Dokuchayev, Bredikhin, Lebedev, Anosov, Butlerov, Bekhterev, Zelinskiy, Pirogov, Dezhnev, Ibn-Sina and other prizes.

To our shame, it should be admitted that there are not even references to these prizes and their winners in our mass press, that we ourselves are inadequately promoting the winners of our scientific awards. And the editorial office of TEKHNIKA I NAUKA takes this reproach to be meant for it.

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INDUSTRIAL PLANNING NORMS, USE OF VUZ SCIENTIFIC POTENTIAL

Baku KOMMUNIST AZERBAYDZHANA in Russian No 5, May 84 pp 37-44

[Article by Rector of the Azerbaydzhan State University imeni S. M. Kirov and Corresponding Member of the AzSSR Academy of Sciences Earth Sciences Department Faik Mamed Ogly Bagirzade: "NTP [Industrial Planning Norms] and Efficient Use of the Scientific Potential of VUZ's"]

[Text] The development of science and technology with regard to the requirements of the modern scientific and technical revolution contributes to solving a complex of economic and social tasks of communist construction and to creating material and spiritual preconditions for thorough and harmonious development of the personality, and it promotes a qualitative transformation of the productive forces and in the aggregate it creates optimum preconditions for progressive growth of the socialist economic system.

Measured tasks, during the solution of which scientific and technical progress and the upbringing of Soviet man are interdependent matters, face the republic's scientific community and particularly the VUZ collectives in light of the decisions of the June and December, 1983, February and April, 1984 Plenums of the CPSU Central Committee, as well as the Azerbaydzhan CP Central Committee plenums that were held in July and December of 1983 and March of 1984. In this connection, the interweaving of two important aspects in the activities of the teaching staff of VUZ's is attracting attention. The first aspect is the training of highly skilled personnel who are capable through their own labor of exerting an influence on the further development of science and technology. The second one is the efficient organization of a scientific search for VUZ scientists in accordance with the urgent problems of the national economy and other realms of public life.

It should be noted that the scientific potential of the republic's VUZ's is sufficiently great. For example, 2 members and 11 corresponding members of the republic's Academy of Sciences, 8 laureates of the State Prize and the Leninist Komsomol Prize, 16 Honored Scientists of the republic, 139 doctors and more than 500 candidates of the sciences are working at the Azerbaydzhan State University imeni S. M. Kirov. There are five problem laboratories here, a scientific research computer center, industrial scientific research laboratories, student design bureaus and so forth. During the current five-year plan,

more than 1,300 specialists were attracted to scientific research work and it's not by chance that during the past 10 years more than 500 books and 10,000 scientific articles on various branches of science were published by the university's scientists.

In December, 1983 at the Azerbaydzhan CP Central Committee plenum, which discussed the tasks of the Azerbaydzhan party organization in fulfilling the CPSU Central Committee and USSR Council of Ministers decree "Measures on Accelerating Scientific and Technical Progress in the National Economy" it was noted: "The task of scientists is to direct efforts towards further increasing the efficiency of basic and applied research and its organic combination with working out the urgent problems of the republic's economic and social development."

The university's scientific collective is actively participating in the solution of these tasks. Economic contractual studies of more than 1 million rubles are being performed annually. During the last 3 years, 8 studies on the state budget and 28 studies on the economic contract were completed and their assimilation into production provided an economic effect of more than 2 million rubles.

Basic theoretical and practical scientific problems are being worked out. In particular, there's a number of achievements in the area of applied mathematics. The mathematicians' research results on inverse problems for various equations of mathematical physics, which found application in geophysics, quantum mechanics and identification theory, received wide recognition; a theory was created for automatic machines and control of them; and research is being conducted on the theory of differential games, mathematical programming, and queueing theory. Right now the creation of ASU [automatic control systems] for industrial processes, as well as modelling of scientific experiments and processing of their results, is assuming greater importance. Mathematical experiments on EVM [computers] must replace highly expensive physical experiments.

A new class of nonlinear crystals and ferrosemiconductors, which possess unique properties, is being researched in the problem laboratory for semiconductor physics. Elements of holographic memory were created that make it possible to record and to store information and that in sensitivity are not inferior to the best world models. The scientists discovered a class of photo-ferroelectric phenomena that make it possible to create a device for transforming an invisible infrared emission into a visible one.

In connection with the problem of influencing the environment of subterranean gas repositories, theoretical prerequisites were developed for creating them with regard to the geological field and external indicators of the reservoir and the conditions of the geological medium. A large series of studies was performed on researching wave propagation in distorted vessels containing a liquid, and that is highly urgent in connection with the extensive use in technology and living organisms (main gas pipelines, oil pipelines, blood circulation system) of systems for transporting a liquid. A task, which is

of interest for space physiology, was solved for modelling the behavior of protracted and shock g-forces.

Research is being conducted at the university with a view to defining questions on the formation of ore and nonmetallic deposits and their conformances to the principle of distribution within the limits of Azerbaydzhan, hydrogeological and land improvement conditions of irrigated lands, searches for new mineral and thermal sources, conformances to the principle of topographical differentiation, and territorial organization of the development and distribution of Azerbaydzhan's productive forces. New data on applied geochemistry of oil and gas are of interest. This study is being accomplished jointly with the Institute of Oil and Chemistry imeni M. Azizbekov. In 1982 a geological map "Geochemical Anomalies of Azerbaydzhan SSR" was published as the result of a joint study with the Azerbaydzhan Geological Administration and the Azerbaydzhan SSR Academy of Sciences Institute of Geology. Its development made it possible to define more precisely the special features of ore-bearing areas and to substantiate the direction of search operations. Factual data were derived on the basis of indicators of geochemical criteria for liquid and gaseous hydrocarbons concerning their occlusions with regard to long-range geochemical anomalies. In 1983 a detailed medium-scale "Topographical Map of Transcaucasia" came off the press. It interprets the wealth of the region's natural conditions and diverse natural topographies in all their extraordinary complexity.

The university's scientists are successfully working out scientific problems that are associated with implementing the food program. The results of nine scientific research studies, which are of applied national economic importance, were proposed for use in agriculture.

Last year, special detergents and plasticizers, the cost of which was two times lower than for the earlier known ones, were synthesized by colleagues of the chemistry faculty. A new method, which is notable for its degree of economy, rapidity and being introduced at 800 of the country's enterprises, was developed for the photometric analysis of iron. A preparation, which underwent successful testing in the fields of Kutkashenskiy and Shekinskiy rayons, was obtained in the department of petroleum chemistry and chemical technology. Its use increased the yield of the "Kavkaz" variety of wheat by 10-12 percent. It's really necessary to note here that colleagues of the biochemistry department jointly with the USSR Academy of Sciences Biology Institute obtained a new preparation under the name of hydrell, which accelerates the ripening of fruits and vegetables without damaging their taste qualities.

A considerable economic effect was obtained thanks to the research of biologists who created two varieties of new organic fertilizer. According to calculations and as a result of their use, tne yield of a number of agricultural crops--and particularly of winter wheat, vegetables and cotton--has increased on an average of 17 to 29 percent.

The university's political economy department concentrated its efforts on working out social and economic problems of scientific-technical progress and labor and problems for improving management of the national economy.

The department of historical materialism is researching the subject of "Dialectics of the Development of Social Relations in a Developing Socialist Society" and it is working out problems on managing social processes. They are being conducted on an economic contract basis at industrial associations and at enterprises of Baku. In particular, social development plans of the "Azelektroterm" and "Azerneftemashremont" associations were developed for the 11th Five-Year Plan by the sociological service functionally attached to the department since 1980. The annual economic effect from introducing its recommendations was more than 1 million rubles. However, I would like for the university's department of social sciences to make a more substantial contribution to the development of science. It should be recognized that the scientific output of this department is not at a sufficiently high level.

At the university, studies in such new areas as social and VUZ psychology are assuming ever greater significance along with traditional research of the problems of historical psychology, cognitive processes and psychology of the personality. During recent years a great deal was done in studying student--teacher interrelations, creative thought and ways for developing it in educational activities and the intensification of selecting those who have completed a secondary education, and in researching the relationships of the examiner and the person who has completed a secondary education and others.

As was emphasized at the June, 1983 Plenum of the CPSU Central Committee, the implementation of enormously complex social and economic programs and the struggle for intensifying production and accelerating scientific and technical progress confront ideological workers with new tasks.

In 1983, an extensive network of organized forms for legal education of the population was active at the university. Scientific research studies were prepared in the law department on problems of the theory of the state and rights, developing the theory of the Soviet constitution and increasing the efficiency of the mechanism for implementing it, and strengthening socialist law, socialist justice and the struggle for the legal regulation of labor in the national economy.

In spite of the presence of positive changes in the university's science trends, it should be noted that we are still far from an optimum organization of scientific research work with regards to the requirements of NTP [industrial planning norms]. The indicated shortcomings appear more noticeably in activities of the republic's pedagogical institutes.

In many respects, the efficient organization of any pursuit is determined by capable managers. However, at times the absence of a sense of responsibility among the managers of scientific and production institutions leads to the fact that subjects selected for research prove to be of little significance both in the theoretical and the practical plan or they become such as a result of unjustifiably prolonged research. One can note also another aspect when the deadlines for incorporating the results of the scientists' tedious labor are delayed because of the negligence of managers, and as a consequence of which they become morally antiquated. A break in the "science--production" chain is obtained in the end. In other words, putting into practice the achievements of

science and technology and bringing about contacts of scientific research institutions with production still aren't at the proper level in our country. All is not well in resolving the given problem in other VUZ's too.

As was noted at the Azerbaydzhan CP Central Committee plenum in December, 1983, a great deal needs to be done in improving the structure of VUZ scientific potential and creating affiliates of cross-sectional departments at enterprises and organizations that will open a broad expanse for different variants of integrating higher schools with production. Undoubtedly, the creation of departmental affiliates at enterprises will be of benefit both to production and the VUZ. This is also an opportunity for VUZ's to directly include students--future specialists--in the solution of pressing production problems and for their "entry" into an occupation. First of all, the leading chairs of the physics, chemistry and biology departments must avail themselves of the opportunity. One must think for a while about forms for attracting specialists with a lot of experience in production work to scientific and educational activities under the conditions of combining staffs in VUZ's. In turn, the production enterprises also must express personal interest as well, while rendering material assistance to the VUZ collectives that are fulfilling their orders and while accelerating the assimilation of obtained results as well. On a basis of this kind it's possible to organize well-equipped experimental bases for scientific research.

The republic's VUZ's have at their disposal a sufficiently broad scientific and technical base, which it's necessary to use more efficiently with a view to increasing the effectiveness of scientific research and creating an atmosphere of creative searching and high activity of all workers. The facts show that often even within a single VUZ they have job splitting, dissipation of scientific strengths, a difference in technical equipment and so forth.

The effectiveness of scientific research is determined also by a manager's ability to direct and get the work of specialists going, but very likely it also depends to no lesser degree on the ability to control its results.

At the present time, one of the basic problems is the creation of a healthy moral and psychological climate in the republic's VUZ's. Thanks to the daily concern of the party and the government, definite successes have been achieved in this direction and the selection and placement of scientific pedagogical personnel has improved considerably. The gifted researchers are a distinctive stock of gold for the republic's science and technology and rendering them assistance must become the civic duty of every manager of a VUZ and its subunits [podrazdeleniye].

One more aspect is attracting attention. Now and then one and the same subject is put down in the name of some VUZ worker for a long period of time, however, nobody is interested in the results of his work. And to what does this lead? A person works for dozens of years in a VUZ, he's conducting serious scientific work practically nowhere and he doesn't have a single published article. One can find good-for-nothing workers and "dependents" of this kind at any VUZ.

The process of collective discussion of research results is important for intensifying scientific and technical progress. In this case, the practical significance of the latter must be the basic criterion for their effectiveness. Each specialist bears great responsibility for the progress of science and technology, for ideological and political maturity and purity of scientific thought, and he must wage a relentless struggle with those who get into science for mercenary motives.

Today it's no longer enough to get the work going for the scientific departments of a single VUZ and it's necessary to integrate the activities of cross-sectional departments of different VUZ's. Such a joining of strengths will afford the opportunity to raise global problems and to resolve them in a comprehensive manner. In this regard, today the scientific contacts of Azerbaydzhan State University and other VUZ's with the Azerbaydzhan Institute of Oil and Chemistry imeni M. Azizbekov are already noteworthy. The matter concerning the organization of "an interVUZ center for providing scientific research", i.e. the creation of a single inventory of equipment and devices in the republic's Minvuz [Ministry of Higher and Secondary Specialized Education] system was the subject of discussion at its collegium and it found its own positive solution.

Scientific contacts of VUZ departments with the institutes or scientific laboratories of Azerbaydzhan's Academy of Sciences also are of no small importance for the efficient organization of scientific research studies in VUZ's. Contacts of this kind are necessary, they break down the insulation and isolation of scientific collectives, and they provide for more efficient use of strengths. Azerbaydzhan State University has extensive and creative contacts with institutions of the USSR Academy of Sciences, union republic academies of sciences, and with the VUZ's, institutions and enterprises of many cities of our country and with the scientists of foreign countries as well.

Thus, within the limits of agreements on creative cooperation, joint research of the problem laboratory for semiconductor physics was conducted with the USSr Academy of Sciences Physics Institute imeni P. N. Lebedev; the problem laboratory of paleobiochemistry with the USSR Academy of Sciences Institute of the Mineralogy and Geochemistry of Rare Elements and with the USSR Academy of Sciences Institute of the Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry; the department of applied mathematics with the Ukrainian Academy of Sciences Institute of Cybernetics imeni M. V. Glushkov; the problem laboratory of the biological department with the Azerbaydzhan Academy of Sciences Institute of Physiology; the astrophysics department with the State Astrophysics Institute imeni Sternberg attached to MGU [Moscow State University] imeni M. V. Lomonosov; the electronics department with Kiev State University imeni T. G. Shevchenko; the organic chemistry department with the Belorussian Scientific Research Institute of Epidemiology and Microbiology; and others.

The level of scientific and technical progress depends upon the quality of training specialists in the republic's VUZ's. Specialists who possess profound scientific knowledge that can be used actively and effectively within the realm of their activities are essential for modern production and science. Personnel also are being trained for the republic by a number of VUZ's of other cities.

It appears that one should be considerate towards graduates of the VUZ's of other cities, try to use these these specialists according to their designation, create conditions for their activities and achieve the maximum output. On the other hand, the republic's Gosplan needs to approach the matter of personnel training in a more flexible manner. Thus, we ourselves aren't able to provide the republic's national economy with marine geologists because of delays in Gosplan. Personnel in this specialty are trained only in Odessa, whereas Azerbaydzhan to wit is a pioneer of maritime petroleum deposits and the first textbooks on this industry were created in our republic.

The Soviet Union is a great maritime power and, naturally, without a knowledge of the geology of sea and ocean beds we can't formulate a proper view concerning geological structure and the direction of prospecting and exploring operations for oil and gas. It seems to us that it's more advisable to include a new discipline in the geology department's plan and to organize a department of "sea and ocean geology" or "oil-and-gas geology of the water area." This discipline must be an intersectorial geological and technical discipline that is an independent branch of oil-and-gas geology. In addition to totally new and purely geological matters, the study of a number of physical and chemical processes that are highly characteristic of and peculiar to marine water areas obviously must be included in its curriculum.

As was noted at the 26th CPSU Congress, we are faced with leading the national economy to the most advanced frontiers of science and technology, to accomplish the wide automation of production, and to provide a cardinal increase in labor productivity and production output on the level of the best world models. And this requires high intellectual and physical development, a profound knowledge of the scientific-technical and economic bases of production, and a conscientiously creative attitude towards labor from each young person who is entering a self-dependent life. All this makes new demands of organizing the educational process not only in the secondary school but also in the VUZ. I'd like to note that the solution of such tasks as the occupational orientation of those who have completed a secondary education, the timely adaptation of students to requirements of the higher school, the formation of social motives for educational activities, and the occupational adaptation of graduates to independent activities still remain a weak spot in the VUZ system.

The party urgently demands an increase in the level of training specialists for basic sectors of the national economy and strengthening their ideological and political training. A special place belongs to the universities in performing this extraordinarily responsible task since a specialist with a university education is a specialist of broad specialization who freely possesses diverse methods of scientific search and who is able to solve serious scientific problems that can promote the acceleration of scientific and technical progress. Mastery of only the full volume of programmed material is no longer sufficient for today's students. It's necessary to develop among them creative and scientific thought, a yearning for broadening knowledge, and the ability to constantly learn and improve their occupational qualities. In the process of training students one must take into consideration the fact that the teacher's way of thinking becomes a model for the student; while listening to lectures and following the train of thought and the process for its genesis and

development, a student actively learns to think. This is a fact not found in textbooks, but one that is so important in forming a creative personality. We must train specialists who know their subject, who love their occupation and who know how to independently examine new information.

One cannot accept a situation of the kind when the grade received by a student doesn't conform to the quality of the assimilated knowledge, and as a result of which young specialists who have graduated from a VUZ with a high grade often prove to be occupationally helpless on the job. It was noted in the basic trends for reform of the general education and vocational school that it's necessary to resolutely eradicate any manifestations of formalism in the content and methods of teaching and educational work in the life of a school and in the evaluation of the knowledge and abilities of students and to overcome so-called percentage mania. This requirement concerns VUZ's to a no lesser degree.

The scientific councils of VUZ's should devote particular attention to the selection and certification of teachers and take into consideration their level of scientific and pedagogical training for the purpose of increasing the level of teaching and educational work. Apparently, the time has come to transfer some VUZ employees to lower jobs, in spite of the presence of an academic degree and rank, as ones who are not meeting requirements and who are not working on increasing the level of their own knowledge and scientific and systematic training.

As is well known, the task that faces universities was emphasized in particular in cy decisions: to raise the quality of teacher training and that undoubtedly is connected with increasing the level of their psychological and pedagogical training. Apparently, it's necessary in the process of resolving it to reinforce the teaching of all interrelated subjects that have a relationship to the future pedagogical occupation of the university's students. In addition to this, the university must increase assistance to pedagogical VUZ's on the matter of organizing scientific research studies. In this connection, suffice it to note that annually more than 450 persons undergo training along the line of the department for increasing the university's qualifications. Specialists not only from the republic's Minvuz are sent here, but also from the USSR Ministry of Agriculture, the RSFSR Minvuz, the Minvuz's of the Central Asian republics and others as well. A continually active conference seminar was organized on the basis of the law department for increasing the qualifications of teachers of the legal disciplines at nonjuridical VUZ's and tekhnikums. All this promotes an increase in the training level of specialists. However, it appears that new means, methods, modes and forms of work, which will be able to satisfy all the demands of the republic's VUZ's, also must be opened up here.

The tasks that were set before VUZ's by the party are immense and it's necessary for each collective of the republic's VUZ's to profoundly realize the social responsibility of scientific and technical progress before the near future and to reorganize its work so that it may successfuly cope with them and

achieve new successes in the matter of training highly skilled scientific and pedagogical personnel for the national economy.



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CONTINUOUS PLAN FOR ACADEMIC SCIENTIFIC, TECHNICAL COMPLEXES

Minsk PROMYSHLENNOST' BELORUSSII in Russian No 5, May 84 pp 32-34

[Article by Candidate of Economic Sciences V. Kudashov, chief of the Patent and License Department of the Physical Technical Institute of the Belorussian SSR Academy of Sciences, sector chief Ye. Kukolko and senior engineer-economist P. Gorobets: "According to a Continuous Plan"]

[Text] The rapid introduction of the achievements of science and technology in production to a significant extent is connected with the development and further improvement of the entire system of management, including the organization of the planning of research and development. The experience of the setting up at academic scientific institutions of special design and technological bureaus with a pilot works (SKTB s OP) proved the viability of academic scientific and technical complexes, which carry out the cycle of operations, starting with basic research and ending with the adjustment of experimental prototypes.

The increase of the role of basic science in the development of new equipment and technology and the increase of its influence on the development of production are a characteristic trait of the present stage of the scientific and technical revolution. Academic scientific institutions, which perform a significant amount of theoretical research, are faced with the task of developing and introducing fundamentally new machines, instruments, materials and technological processes.

The special design and technological bureaus with a pilot works and the central design bureaus with a pilot works, which have been set up at a number of institutes of the Belorussian SSR Academy of Sciences, played an important role in its accomplishment. Suffice it to say that the economic impact from the introduction of developments of the Belorussian SSR Academy of Sciences last year increased by 3.2-fold as compared with 1976, when the establishment at institutes of their own design, technological and production base began. Moreover, the nine scientific and technical complexes of the Belorussian SSR Academy of Sciences account for three-fourths of the total amount of the economic impact, which was obtained by all the scientific institutions of the academy.

The scientific and technical complexes organize their activity in conformity with various planning documents. Among them are the programs on the solution of unionwide and the most important republic problems; the plans of the most important scientific research work in the area of the natural and social sciences for the Belorussian SSR and the scientific research work which is being performed in accordance with economic contracts; the thematic plan of experimental design and scientific research work; the list of basic items which are to be produced at the pilot works.

The existence of such a number of planning documents is explained by the different sources of the financing of scientific research and experimental design work. Moreover, the lack of the necessary reserves and the economic independence and isolation of scientific research institutes and their special design and technological bureaus with a pilot works complicate the joining of types of activity, which are different in nature (research, development, production), into a unified plan. At the present stage, when specific reserves have been created and experimental design work is a continuation of scientific research, the separate planning of the activity of scientific research institutes and special design and technological bureaus is moderating the rate of scientific and technical development and is not promoting the shortening of the time of the introduction of scientific achievements in production.

Planning by volume, which has been used more and more extensively in recent times, is an unquestionable step forward, but it cannot solve completely the problem of the efficient use of the scientific and technical potential of academic scientific and technical complexes. The point is that the balancing of the workload of subdivisions according to the total volumes does not ensure the continuity of the process of the development and introduction of individual types of new equipment.

The replacement at a number of complexes of the annual plan of pilot production with a "List of Basic Items Which Are to Be Produced at the Pilot Works" should be regarded as one of the drawbacks of the existing system of the planning of the activity of academic scientific and technical complexes. In practice the approval of the "List" is carried out in the absence for a number of items of technical specifications, without technological study and norm setting. Such a procedure leads to the dragging out of the period of the filling of the orders of laboratories and, as a result, to the increase of the cost of items. The preconditions of possible disruptions are formed already at the stage of the drawing up of the drafts of the schedules of work on economic contracts, since in them the stages, which reflect the preparation of production, are absent. Finally, in the presence of all the units (the laboratory, the design and technological division, the pilot works), which are taking part in the fulfillment of their own stage within one economic contract, separate planning leads to numerous consultations in case of the transition from one stage to another and, of course, to the unjustified lengthening of the time of fulfillment.

The principle of "continuous planning" is a promising direction of the improvement of the planning of scientific and technical developments. The essence of this principle consists in the joining and consideration in a

unified plan of all the stages of the "research-production" process, starting with scientific developments and ending with the introduction of their results in production. Here the available resources are distributed among the performers of the individual stages, specific dates of fulfillment are also established.

The system of continuous planning for academic scientific and technical complexes, which makes it possible in a relatively short time to embody a fundamental idea or invention through a design development in a prototype with subsequent introduction in industrial production, is especially justified.

The continuity of the process of the development of a scientific idea to its materialization in a specific model comes about owing to the existence in the academic process of interacting scientific and design and technological subdivisions and a pilot works. In our opinion, a skillfully organized and properly used system of continuous planning will make it possible to shorten even more the time of the "research-production" process.

Let us show this on the basis of the example of developments of the Physical Technical Institute of the Belorussian SSR Academy of Sciences. The cross-wedge rolling mills, which were developed at the Physical Technical Institute and make it possible to increase the productivity as compared with turning by 10-fold and to increase the utilization ratio of metal to 0.85-0.98, are well known in the USSR and abroad. The economic impact from their use at enterprises of tractor and agricultural machine building, the automotive industry and other sectors exceeded 5 million rubles. The mills have been delivered in accordance with license agreements to Bulgaria and Italy.

The set of these operations includes the conducting of research in case of the rolling of parts of a specific type size, designing, the production of the mill and tools, adjustment, testing and introduction. Previously 3-4 years would have been required for this. With the changeover to continuous planning the total time for conducting these operations will come to 1.5-2 years. Thus, the cross-wedge rolling complex, which was designed and produced in accordance with a license agreement with Bulgaria, including its adjustment and the conducting of scientific research work, was delivered in 18 months.

The presses for percussion sheet-metal stamping, which were developed at the institute, make it possible to obtain parts of complex forms made from hard to deform materials and ensure a five- to eight-fold decrease of the time of the production of machine tool attachments, are especially promising for various sectors of industry. Great interest has been displayed in the presses, two of them have been delivered to Sweden and Italy in accordance with option agreements.

Usually 2-2.5 years are required for the designing, production and adjustment of the press. According to the "continuous" plan, which includes scientific research, designing, the technological preparation of production, production, adjustment and introduction, this time will be shortened to 1.5 years.

Consequently, the system of continuous planning will promote the acceleration of the introduction of scientific and technical achievements in production. However, certain difficulties exist in the development and use of this system. As was noted above, they are incorporated directly in the organizational structure of the academic complexes and are expressed in the relative isolation of their subdivisions. The legal and economic independence of the scientific research and experimental design subdivisions forms organizational barriers both between these institutions as a whole and between their separate structural units.

Internal economic contractual (subcontracting) relations, which arise every time between the subdivisions of the complex after the conclusion of a contract for the fulfillment of a theme (job), also contribute to this. As a result the institute, when playing the role of the general contractor, should accept the prototype, which has been developed by the special design and technological bureau, and turn it over to the client, that is, should act as a middleman, bearing in this case responsibility for the work of the coperformer--the special design and technological bureau with a pilot works, which is called upon to bring scientific development up to introduction. Moreover, at the stage of introduction in a number of cases it is impossible to do without the revision of the technical specifications, which again requires a large number of consultations within the subdivisions. As a result of this the time of the passage of a scientific idea to the stage of materialization in a prototype or experimental model increases.

The unified (continuous) plan on a specific theme, which reflects the content and special purpose of each stage of scientific research and experimental design work, the amounts and dates of the performance of the work and the sources of financing, in our opinion, should be the basic form of the realization of the system of the continuous planning of research and development. Not only all the intermediate stages of research and development, but also the work on material and technical supply and the organizational and technological preparation of production should be included without fail in the continuous plan.

The final stage of the continuous plan is the turning over to production and the assimilation of new equipment or a new set of machines for the implementation of a new technological process.

It is advisable, in our opinion, to carry out the order of the drawing up of the continuous plan in the following sequence. The responsible (main) performer of the theme (the laboratory of the institute) on the basis of a tentative understanding with the client sends to the production planning division an official memorandum for the drawing up of an economic contract and a draft of the schedule, on the basis of which the continuous plan is drafted.

The stages of the work, which are distinguished in the draft of the schedule, should reflect the intermediate goals, which have been coordinated with the client and are backed with financing, which is carried out, as a rule, from the assets of the interested enterprises, ministries and departments, as well as foreign trade organizations. The production planning division draws up a draft of the continuous plan on the theme, coordinating the fulfillment of the

stages with their material and technical supply. It is advisable to examine the drafts of the plans at production conferences or in the Scientific Council of the institute. After the approval of the plan the assignments on the fulfillment of the stages of the work are reported to each subdivision performer.

Thus, the system of continuous planning creates a common base for the coordinated fulfillment of all the stages of scientific research and experimental design work by the basic and auxiliary subdivisions of the complex with an orientation toward the achievement of the ultimate goal--the introduction of scientific and technical achievements in production. It is advisable to use this system, first of all, in case of the performance of applied research and development, which envisage the development of new technological processes and prototypes of equipment. In the future continuous planning in combination with the matrix structure of management will make it possible to link the functional responsibility of managers (from top to bottom) for the work by stages of the scientific and technical cycle with the responsibility for development, which runs horizontally through all the basic subdivisions of the association. Along with this the management of the "research-production" cycle will also become more efficient and more of a systems nature.

The practical implementation of the system of continuous planning is dependent to a certain extent on the organizational structure of management. Its most effective use can be ensured under the conditions of a unified scientific research, design and technological and production economics complex, which carries out all the stages of the "research-development-pilot production-introduction" process. The introduction of the system of continuous planning is a qualitatively new stage, which makes it possible to carry out in the future the changeover to a new organizational structure--the academic scientific and technical association.



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MECHANISM OF INTRODUCTION OF SCIENTIFIC ACHIEVEMENTS IN BELORUSSIA

Minsk PROMYSHLENNOST' BELORUSSII in Russian No 5, May 84 pp 35-37

[Article by M. Gavrilenko, chief of the Division of the Coordination of Scientific Research Work of the Minsk Tractor Plant imeni V. I. Lenin Production Association, and D. Solov'yev and S. Vermeyenko, staff members of the Problem Scientific Research Laboratory of the Scientific Organization of Labor of the Belorussian State Institute of the National Economy imeni V. V. Kuybyshev: "The Crown to the Matter"]

> [Text] The introduction of the results of scientific research work is the concluding stage of the "research-production" cycle. The importance of the labor of researchers for the national economy is determined precisely here. "The decisive, most urgent section today," it was emphasized at the 26th CPSU Congress, "is the introduction of scientific discoveries and inventions." Thus, success in many ways depends on the improvement of the mechanism of introduction.

The collective of the Problem Laboratory of the Scientific Organization of Labor of the Belorussian State Institute of the National Economy imeni V. V. Kuybyshev has analyzed the mechanism and results of the introduction of the developments of higher educational institutions at a number of enterprises of machine building and the food industry. What did it ascertain?

As is known, first of all the urgency of the themes, the level of design and technological study and the availability of the necessary material, manpower and financial resources influence the time and effectiveness of introduction. Moreover, the changes of the technological process, the "conditions of the moment" (for example, the level of fulfillment of the plan assignments by the enterprise) and the personal factor (the attitude of the managerial personnel of the enterprise toward the problems of introduction) are of importance.

Now at the higher school, in order to prove the fact of the introduction of a work, it is sufficient to present the appropriate statement or certificate on its use. In practice it frequently happens that the "Certificate of Introduction" is available, even the economic impact has been calculated, but the enterprise has not received a ruble.

Let us assume that the client enterprise should transfer a portion of the economic impact to the account of the higher educational institution which is the performer. In such a case the plant workers will treat more strictly not only the procedure of signing the certificate, but also the process of the fulfillment of the work: the choice of the themes of research, the acceptance of equipment, the payment for research and so on.

The urgency of the themes of research for the needs of the enterprise (the technical and economic substantiation of research) is determined at the stage which precedes the conclusion of the contract. For example, at the Minskiy traktornyy zavod imeni V. I. Lenina Production Association the comprehensive organizational system of the development and introduction of new equipment, which includes the planning of research, the development and introduction of new machines and technological processes, as well as a set of organizational and technical measures, which encompass the "research-development-production of output-operation" cycle, serves this purpose. In other words, the methods of goal program planning are used here.

Here first of all the objective need for new machines and technological processes and their social significance and the present trends of world and domestic science are taken into account. Not only research, but also the supply of all the stages of the technological process with a set of new equipment, which mechanizes and automates production the most, and the forms of the moral and material stimulation of the performers subject to the effectiveness of each stage and the entire program of the development of new equipment as a whole are planned.

For the increase of the effectiveness of science of higher educational institutions as a whole it is necessary, moreover, to eliminate the duplication of research themes in the system of the Belorussian SSR Ministry of Higher and Secondary Specialized Education. Why, for example, does not the ministry jointly with the Belorussian Scientific Research Institute of Scientific and Technical Information organize the publication of a list (by fields of the sciences) and a short description of the themes, which have already been fulfilled or can be fulfilled by specific higher educational institutions (in other words, organize notification on the available reserve)? The establishment in the system of the Belorussian SSR Ministry of Higher and Secondary Specialized Education of an organ, which engages in the formation of a "portfolio of orders," would be a radical solution of this problem.

This matter, of course, is not simple. It is necessary, on the one hand, to analyze constantly the basic scientific directions and trends in the development of scientific and technical progress and, on the other, to maintain constant contacts with ministries, departments and enterprises and to identify the scientific, technical, economic and social problems, which arise in practical activity and require timely solution. Precisely the ministry could generalize the demands of interested organizations for the solution of current and long-range problems, could best select the higher educational institutions, which are the performers, could distribute the job orders among them and monitor the timeliness and quality of the introduction of scientific research work in production.

The urgency of the themes of research, undoubtedly, will increase, if the conclusion of the contract for the performance of scientific research work is preceded by its discussion in the scientific and technical council of the enterprise. This will make it possible to make greater demands on the themes and the scientific and technical level of the results of the work. For example, at the same Minsk Tractor Plant an economic contract with a higher educational institution is concluded only if a certain reserve on the theme of the research already exists.

The contract on the turning over of scientific and technical achievements and the provision of assistance in the use of borrowed advanced know-how is one of the most effective forms of the contact of science of higher educational institutions with production. Its effectiveness has been proven by life itself. For example, at the end of the last five-year plan each ruble of expenditures, which was invested in such a contract (on the average for the Belorussian Polytechnical Institute, the Belorussian Technical Institute, the MRTI [expansion unknown] and the Belorussian State Institute of the National Economy imeni V. V. Kuybyshev), yielded an economic impact of 17.8 rubles. Moreover, this impact is not the estimated, but the actual impact. That is why the policy of the extensive use of precisely this form of the contact of science with production has been adopted in the system of the Belorussian SSR Ministry of Higher and Secondary Specialized Education. The publication by the Belorussian SSR Ministry of Higher and Secondary Specialized Education of a catalogue of the performed research with technical and economic descriptions of the obtained results would be a logical continuation of this work. The familiarization of the enterprises, which are potential consumers of this research, with it would make it possible to increase the scale of the use of contracts on the turning over of achievements.

Frequently the developments of scientists of higher educational institutions do not find application due to the low level of design execution, which, in turn, is explained by the inadequate material and technical base of higher educational institutions and the low practical preparedness of the personnel who are working on the problem (technical documentation is usually carried out at the level of course or graduation projects). Moreover, the stimulation of the labor of developers does not depend, as a rule, on the significance of the national economic results.

The use by scientists of higher educational institutions of the material and technical base of enterprises is making it possible to improve the material and technical supply of research. Direct long-term ties (educational scientific production associations [UNPO's], base chairs at enterprises and so on) yield the greatest impact here. Moreover, direct long-term ties with the client enterprise make it possible to organize the long-range planning of the basic directions, themes and amounts of research. In order to use more completely the advantages of educational scientific production associations, the research being performed outside the educational scientific production associations should probably be limited. This will provide a mighty stimulus for the further development of associations both quantitatively and qualitatively. On the other hand, the establishment of educational scientific production associations increases the overall responsibility for the

acceleration of the introduction of scientific developments in production and improves the quality of the training of specialists.

The introduction of the results of research is usually envisaged in the contracts on the performance of scientific research work, while the deadlines and the workers responsible for this are indicated in the schedules. It is clear that if the need arises for the modification of the equipment and technology being introduced and the attraction of additional resources, which are strictly limited at enterprises, this is insufficient. A more rigid connection of scientific research work with the plans of organizational and technical measures is needed.

Here is just one example from the joint activity of the Belorussian Polytechnical Institute-Minsk Tractor Plant educational scientific production association. Scientists of the Belorussian Polytechnical Institute and the collective of the laboratory of physical metallurgy and heat treatment of the Minsk Tractor Plant developed a process of the thermal diffusion hardening of a stamping tool, which increases the durability of stamps by twofold. The production tests of the prototypes confirmed the great efficiency of this technology. However, the authors of the development overlooked such an important question as the observance of public health norms and the working conditions of the workers. Of course, the introduction of the process was halted. As a result the plant continues to incur losses of high quality and tool steel.

As strange as it may be, at present developers are paid not for the achievement of the planned result, but only for the process of performing research. The early fulfillment of scientific research work means that the immediate performers of the work will suffer noticeably in wages. Of course, remuneration is expected for the "saved time," but its amount in case of the early completion of economic contracts does not offset the losses in wages. It is not surprising that at the higher school there are practically no cases of the early (by 6 months and more) completion of research in accordance with economic contracts. On the contrary, the extension of the research period is characteristic. The time is ripe to reorient the financing of research from the process to the result, regardless of the time of its achievement. At the Minsk Tractor Plant, for example, job orders have become the basic form of the planning and financing of scientific and technical developments and their introduction in production. Unfortunately, at the higher school they are being used only formally. Here, as 10 years ago, the fulfillment of the individual stages of the economic contractual work, and not of the work as a whole after its completion, is paid for.

The Problem Laboratory of the Scientific Organization of Labor of the Belorussian State Institute of the National Economy imeni V. V. Kuybyshev proposes the following procedure of the financing of economic contractual scientific research work. The settlements between the higher educational institution and the enterprise are made only after the completion of the work as a whole; the financing of individual stages of the research is carried out by means of bank credits. The payment for bank credit is made after the completion of the settlements of the client enterprise with the higher educational institution which is the performer. This will make it possible to

increase the responsibility of the scientists of the higher school for the end results of research. For the shortening of the period of the introduction of the developments of higher educational institutions it is also proposed to establish a close dependence between the amount of the bonus payment and the time of introduction. Here it is possible to determine the amounts of the bonus payment according to the formula:

$$P_a=P_e/[1.5n-1], \text{ where}$$

$P_a$ is the actual amount of the bonus payment; $P_e$ is the estimated amount of the bonus payment for introduction; n is the year of introduction after the completion of the research on the theme (n is greater than or equal to 2).

If the results of research are introduced within 1 year after its completion, the actual amount of the bonus payment should be equal to the estimated bonus payment. Let us note, however, that this applies only to the research which solves current problems of scientific and technical progress. There are also such developments, the results of which may find use only in the future (if, for example, the level of the development of production does not make it possible to use them at the given stage). The experience of Bulgarian colleagues from the Progress Center of Rapid Introduction or the practice of the Moscow Motor Vehicle Plant imeni I. A. Likhachev, where a system of the rapid introduction of the results of scientific developments has been in operation for several years now, should be used in this case. Thus, at the Moscow Motor Vehicle Plant imeni I. A. Likhachev the time of introduction has been shortened by one-half (the saving in the past 6 years came to 134 million rubles).

Among the people they say: "All's well that ends well." The successful completion of research and laboratory tests and the successful defense of a dissertation, no matter how important they may be in themselves, are only half the matter. First of all the economic impact of the expended efforts is important for the economy of the country. A significant reserves of the efficiency of not only science of higher educational institutions, but also the national economy as a whole lies in the improvement of the mechanism of the economic contract.



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INTERDEPARTMENTAL SPECIAL-PURPOSE SCIENTIFIC PRODUCTION ASSOCIATIONS

Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 4, Apr 84 pp 48-52

[Article by Candidate of Economic Sciences M. Shvayka (Lvov): "Interdepartmental Special-Purpose Scientific Production Associations"]

[Text] In the fulfillment of the program of the economic and social development of our country, which was outlined by the 26th CPSU Congress, an important role belongs to scientific and technical progress, which under present conditions is becoming the basic means of the changeover of the economy to the intensive means of development. Increased demands on science are formulated in the decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures on the Acceleration of Scientific and Technical Progress in the National Economy," in which a most important task is posed--to ensure during the next few years the output of machines, equipment, instruments, materials and other products, which conform in their technical and economic indicators to the highest world level, as well as to introduce advanced technologies and advanced methods of the organization of production and to accomplish on this basis the substantial increase of labor productivity. The great importance of the intensification of scientific research, the shortening of the path of the movement of scientific ideas to production, the improvement of the forms of the relations of scientific institutions with enterprises, the assurance of the integration of science and production and the achievement of an increased return from the expenditures on scientific research and development is governed by all this. Scientists of the western oblasts of the Ukrainian SSR, where during the years of Soviet power a mighty scientific potential has been developed and intensive research on important directions of science and technology has been launched, are also making their contribution to the accomplishment of these tasks.

In the region 18 scientific institutions of the Ukrainian SSR Academy of Sciences, 24 sectorial scientific research institutes and 25 higher educational institutions are in operation. About 16,000 scientists and scientific teaching personnel, among whom there are 550 doctors and 6,000 candidates of sciences, work in the system of academic and sectorial science and science of higher educational institutions.

A modern material and technical base of research institutions has been created. An entire academic campus, in which buildings, laboratories, workshops and pilot plants of the Physical Mechanical Institute of the

Ukrainian SSR Academy of Sciences, the Institute of Applied Problems of Physics and Mathematics of the Ukrainian SSR Academy of Sciences, the Institute of Geology and Geochemistry of Combustible Materials of the Ukrainian SSR Academy of Sciences, as well as scientific subdivisions of the Production Association imeni V. I. Lenin, the Termopribor Scientific Production Association and others have been built, has arisen on the new Scientific Street in Lvov.

Significant scientific achievements in the area of basic and applied research, the high level of which has received recognition in the country and abroad, were the result of the measures being implemented in the region. Well-known scientific schools, which are ensuring the solution of the most important problems of science and scientific and technical progress, have developed in a number of scientific trends.

The development of science in the region took place alongside radical socialist transformations, industrialization, the cooperation of agriculture and the elimination of the former cultural backwardness. During the Soviet period with the fraternal assistance of all the peoples of our homeland the western oblasts of the Ukraine as a component of the unified national economic complex have turned into an important economic region with highly developed industry and agriculture. The petroleum and gas, mining and chemical, coal, machine building, instrument making and other sectors of industry now determine the character of the region. The enterprises of these sectors need the constant assistance o. science, without which their further improvement is inconceivable.

The strengthening of the influence of science on the increase of the technical and economic level of enterprises to a significant extent depends on the perfection of the forms of the management of scientific and technical progress and the effectiveness of the relations of scientific research organizations with enterprises.

An important role in the management of scientific and technical progress belongs to the Ukrainian SSR Academy of Sciences and its Western Scientific Center, which was established in 1971. There is in operation here an effective form of the management of scientific and technical progress in the region, which is based on the established: interdepartmental special-purpose scientific production associations (MTsNPO's), to which academic and sectorial scientific research institutions and higher educational institutions, as well as production associations and enterprises belong; intersectorial scientific production complexes (MNPK's), which encompass interdepartmental special-purpose scientific production associations which are close in specialization; joint interdepartmental scientific and technical laboratories by means of the attraction of the resources of departments, associations, enterprises and scientific research institutions and, finally, educational scientific production associations (UNPO's), in which higher educational institutions and enterprises, as well as academic and sectorial scientific research institutions are included.

Great merit in the development of this new organizational form, which ensures the close cooperation of scientific organizations with enterprises, belongs to the Lvov Oblast Committee of the Communist Party of the Ukraine, which was able to rally scientists and scientific and technical personnel to the solution of the basic problems of the increase of the efficiency of social production. This system by its nature is complex and includes several components (subsystems). Five-year comprehensive plans of the development of scientific research and the promotion of scientific and technical progress, which are drawn up in all the oblasts of the region with allowance made for the demands of enterprises and the real possibilities of the scientific institutions, are the basis for its work. Basic research, in the conducting of which the scientific organizations of all departments are enlisted, holds the central place in this plan.

Goal programs, which envisage progressive high quality solutions of the urgent economic problems which are connected with the development of highly productive equipment, instruments, apparatus and new technologies, which ensure the saving of fuel, energy and raw materials and the increase of labor productivity, product quality and production efficiency as a whole, are a well-developed component of the system of the management of scientific and technical progress, which has been introduced in the region. The fulfillment of the entire amount of work of the "science-production" cycle, starting with the origination of a scientific idea to the introduction in production of the finished development, is encompassed by these programs. The well-balanced organizational system of the management of these programs is contributing to their successful fulfillment. Interdepartmental special-purpose scientific production associations (MTsNPO's), the first public organs of the management of scientific and technical progress in the country, were established for this purpose in the region on a contractual basis. They are formed by the uniting of academic and sectorial scientific research institutions and higher educational institutions, as well as laboratories with production associations and enterprises.

The 13 established interdepartmental scientific and technical laboratories, which are being used in the interests of not 1, but many enterprises, are in keeping with the development of the new technologies being introduced and the making of machines, instruments and assemblies suitable for mass production.

With the establishment of interdepartmental special-purpose scientific production associations the transition to a qualitatively new stage in the interrelations of science with production was ensured. Long-term close cooperation of scientific institutions with enterprises, which is aimed at the accomplishment over a long time of complicated scientific and technical tasks, is succeeding sporadic economic contracts, which are concluded for the purpose of solving individual scientific and technical problems. Such a transition stems from the fact that it is possible to solve successfully the current problems, which face the enterprises of the region, only by the creative unification for joint work of many collectives and production workers of various scientific trends and specialties.

The scientific and technical council, whose functions include the operational supervision of specific developments on the implementation of the goal

program: the drawing up of a coordinating plan of the activity of the association and its submittal for approval to the performers, the scientific and technical supervision of development, the settlement of questions of the material, scientific and technical support of the work on the comprehensive program, as well as additional operations and the monitoring of the fulfillment of the program, carries out the general management of the association.

During the 10th Five-Year Plan 15 interdepartmental special-purpose scientific production associations of various sectors of industry successfully carried out their activity in the western region of the Ukrainian SSR. More than 60 scientific research and planning and design organizations and industrial enterprises, in which more than 2,500 scientists and engineering and technical personnel are united, are included in them.

During this period 30 educational scientific production associations (UNPO's), in which higher educational institutions carried out scientific and technical development for enterprises (here students of the senior years were enlisted extensively in research), also operated successfully in the region.

The educational scientific production associations are promoting the increase of the efficiency of the use of the scientific potential of higher educational institutions, at which a large portion of the specialists of the highest skill work (85 percent of the scientists of the region, who have degrees, are concentrated at higher educational institutions). The participation of instructors in the solution of national economic problems is also important for the formation of the scientist himself and the quality of training of specialists. The lectures of a scientist, which are based on the materials which have been developed by him and implemented at enterprises, are characterized by profundity and a problem-solving nature.

The training of scientific personnel is also being improved. The process of the training of a scientist is being cut in half.

It is possible to illustrate the effectiveness of the new organizational form by the data on the results of the activity of the 8 educational scientific production associations, which have been organized under the auspices of the Lvov Polytechnical Institute, of which, in addition to 28 chairs of the institute, the Physical Mechanical Institute of the Ukrainian SSR Academy of Sciences, the Institute of Applied Problems of Physics and Mathematics of the Ukrainian SSR Academy of Sciences, sectorial scientific research institutes and others are a part. During the past 3 years alone the associations performed work worth 5.4 million rubles and from the introduction of the recommendations on 39 completed themes obtained an economic impact in the amount of 6.7 million rubles.

The formation of the program and the establishment of associations created the need for the coordination of their activity, the assurance of the unity of the approach and the determination of the prospects. For this purpose intersectorial scientific production complexes (MNPK's), to which the monitoring and supervision of the activity of the interdepartmental special-purpose scientific production associations, which are close in specialization,

the formation of the programs of scientific and technical progress of the region, the determination of the special-purpose assignments for the enterprises, without which the interdepartmental special-purpose scientific production associations for their fulfillment cannot be established, and the preparation of proposals for the directive organ are assigned, were established with respect to the sectors of the national economy, which are characteristic in the region.

The executive body of the complex is the collegium, which is headed by a prominent scientist, the chief or deputy chief of the corresponding department of the oblast party committee is his deputy. Representatives of the corresponding associations are members of the collegium. In the western region during the years of the 10th Five-Year Plan four such complexes operated successfully: the instrument making complex, to which five associations belong; the machine building complex (four associations); the geological and geophysical complex (three associations) and the agricultural complex (three associations).

During the 11th Five-Year Plan another three complexes have been set up: the chemical technology complex with two associations, the socioeconomic complex with three associations and the Health Complex with three associations.

The establishment of complexes and associations marks a qualitatively new stage in the integration of science and production, which is making it possible to solve complex scientific and technical problems. The establishment of interdepartmental special-purpose scientific production associations afforded new opportunities for the intensification of scientific research, the acceleration of the process of bringing scientific developments up to a state of complete readiness for use in production and the quickest possible introduction of completed developments at enterprises.

Being an equal member of the scientific production community, the enterprise can go with an order directly to its general contractor, the collegium of the complex, which has all the means to mobilize the efforts of various institutes, design bureaus and plants for the prompt solution of some complex scientific and technical problems or others. Owing to this the need to get an agreement on questions in many departments is disappearing. In this way friendly collectives, which are capable of solving complex scientific and technical problems, are being united from isolated organizations and enterprises. A well-balanced organizational system of the management of scientific and technical progress in the region, which is connected fundamentally with the statewide system which it augments, is being created. This system is contributing to the harmonious combination of operations at all the stages of the cycle, which encompasses basic research--applied research--development--production.

Since interdepartmental special-purpose scientific production associations are elaborate scientific production complexes, which contain scientific institutions engaged in basic and applied research, as well as introduce the results of this research in production, they are capable of performing the entire set of operations, which are connected with the development and the organization of the production of new equipment. Favorable conditions are

being created for the proper distribution of assignments among all the participants in development and the simultaneous performance of operations at all the stages of the "science-production" cycle. By closely interacting, these units are ensuring the acceleration of the development and assimilation of new equipment.

Substantial animation in the activity of scientific institutions was a direct consequence of the form of the integration of science and production, which emerged in the region. The attitude of production enterprises toward the results of the activity of scientific institutions also changed; they began to display not only a lively interest in them, but also to desire to bring developments a bit more rapidly up to a state suitable for introduction and, finally, to introduce them at their own place. For scientific institutions the joint work on the implementation of the programs is ensuring the introduction of the results of research in production, for enterprises it is ensuring the raising of the technical level of production and the increase of product quality.

The continuity and synchronism of the processes of scientific research, technological development and introduction are being ensured. The unification within the interdepartmental special-purpose scientific production associations of academic and sectorial scientific research institutes and higher educational institutions, planning and design and technological organizations, pilot experimental and production enterprises and associations is making it possible to implement consistently the principle of the comprehensive planning of developments from the origination of the scientific idea to its practical introduction in production. The simultaneous performance of operations at all the stages of the "science-production" cycle is making it possible to shorten substantially (in many cases by one-half) the time of the introduction of scientific developments in production.

The new form is creating the conditions for the strengthening of the research material and technical base. The ministries, which are interested in especially important developments, are organizing laboratories and are allocating computers, equipment, instruments and materials. The use of the available material research base of scientific institutions is improving. Access to work at the laboratories of scientific research institutions, which are furnished with the latest equipment, is being afforded to the workers of higher educational institutions, at which the necessary material base for research does not exist. The developments of scientists of higher educational institutions are frequently brought up to a state suitable for introduction in production at the design bureau and pilot works of academic and sectorial scientific research institutes.

The strengthening of party supervision of scientific and technical progress on the part of both oblast, city and rayon party organs and the primary party organizations of scientific institutions and enterprises is an important merit of the new organizational form.

The following data confirm the great economic effectiveness of the new organizational form. During the first 4 years of activity of the interdepartmental special-purpose scientific production associations on the

implementation of the comprehensive programs scientific research work in the amount of 21 million rubles was performed and 200 completed developments, which made it possible to increase substantially the technical level of production and to improve product quality, were introduced in production. In 1983 alone the economic impact came to 56.9 million rubles. Each ruble of expenditures yields an economic impact of about 7 rubles. As compared with the average annual indicators during the 10th Five-Year Plan the amount of scientific research work last year increased by a third, its efficiency increased by 61 percent, while the number of introduced developments increased by more than twofold.

The awarding of the Ukrainian SSR State Prize in the area of science and technology for 1983 to scientists of Lvov University, the department of the Institute of Theoretical Physics of the Ukrainian SSR Academy of Sciences and the Institute of Geology and Geochemistry of Combustible Materials of the Ukrainian SSR Academy of Sciences was recognition of the high level of the research being conducted in the region.

The interdepartmental scientific production complexes and associations are operating successfully, are being strengthened and developed and have the prospect of development. Having gained abundant experience in the solution of complex scientific and technical problems, at the same time they see well the difficulties which stand in their way.

Under the conditions of the wide recognition of the effective and mobile form of the integration of science and production, which has emerged in the region, and the display of extensive interest in it in other regions the development in every detail of the mechanism of the management of interdepartmental special-purpose scientific production associations and especially the economic mechanism, in which substantial shortcomings, which stem, first of all, from the laxity of the introduction of cost accounting methods of the management of science, scientific research and the introduction of scientific developments in production, are occurring, is acquiring great importance.

Enterprises lack the assets, which are needed by them for the technical improvement of production. These assets are accumulated at the highest levels of management. Thus, the technical improvement of production has not been programmed in the economic mechanism, and it has to be carried out primarily by administrative methods. It is possible to solve successfully the problems of the technical improvement of production only by means of the complete self-financing of all expenditures (including scientific research measures).

With the adoption of the decree of the CPSU Central Committee and the USSR Council of Ministers "On Additional Measures on the Broadening of the Rights of Production Associations (Enterprises) in Planning and Economic Operations and on the Increase of Their Responsibility for the Results of Work" favorable conditions are arising for the creation at enterprises of reliable sources of the financing of the technical progress of production. The improvement of cost accounting will become an important prerequisite of the use of the form of the integration of science and production, which originated in the region, in other regions.

The settlement of the questions, which arise when fulfilling the goal programs and are connected with the coordination of the scientific, technical and production interests of the region with the interests of the sectors, departments and the enterprises subordinate to them, is a condition of the development of a well-balanced mechanism of the management of the interdepartmental special-purpose scientific production associations. It is necessary to broaden substantially the rights of the scientific and technical councils of the interdepartmental special-purpose scientific production associations and especially the collegiums of the intersectorial scientific production complexes in the coordination of operations and the settlement of questions, which have a substantial influence of the efficient use of the production, scientific and technical potential of the region, as well as raw material, material and manpower resources and on the mechanization and automation of labor. Ministries and departments do not always display proper concern for this.

It would be a mistake to think that all the questions, which are connected with the elimination of departmental trends and the obstacles in the way of the intensification of scientific research and the quickest possible introduction of scientific developments in production, are immediately settled by themselves with the emergence of interdepartmental scientific production complexes and associations, of which such different "partners," which are subordinate to various departments, are members.

At present many economic and organizational problems, which are connected with the management of the activity of interdepartmental special-purpose scientific production associations and, in particular, with the financing of programs, the stimulation of the participants in development, the settlements for completed operations and others, have not yet been solved.

The concentration of financial resources in the hands of the executive body of the program is an important prerequisite of goal program management.

Thus, great possibilities of the further technical improvement of production, which do not require significant expenditures, are still concealed in the form of the integration of science and production, which has been developed in the western region, and it is necessary to use them in every possible way. The historic decisions of the the 26th CPSU Congress, which outlined an imposing program of the growth of production, the increase of its efficiency and the increase of the well-being of the working people, are aiming the workers of science and production at this.



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SCIENTIFIC, TECHNICAL PROGRESS IN ESTONIAN SSR

Economic Problems

Tallinn SOVETSKAYA ESTONIYA in Russian 20 Jun 84 p 2

[Interview with I. Yyeryuyut, deputy director for science of the Institute of Economics of the Estonian SSR Academy of Sciences, and T. Rayasalu, chief of the Sector of Regional Economics of the Institute of Economics of the Estonian SSR Academy of Sciences, by SOVETSKAYA ESTONIYA correspondent A. Favorskaya: "The Tomorrow of the Economy. What Is It to Be?"]

> [Text] I. Yyeryuyut, deputy director for science of the Institute of Economics of the Estonian SSR Academy of Sciences, and T. Rayasalu, chief of the Sector of Regional Economics of this institute, reflect on this in an interview with a SOVETSKAYA ESTONIYA correspondent.

[Question] Our readers are frequently interested in what the scientific and technical character of the republic will be tomorrow. In principle several questions converge here: What shortcomings does our present economy have, how will they be overcome, what are the prospects of its development? Your institute is the main one in the drawing up of the comprehensive program of scientific and technical progress of the Estonian SSR for 1986-2005. How does the picture appear to economics scholars?

[Answer] Let us proceed from the situation which is now forming. It is well known: until practically the end of the century all the tasks in the production sphere will have to be accomplished with the present amount of manpower. At the same time production should be developed, it is necessary to build new enterprises and shops and to renovate old ones. The only possibility to cope with all this is to increase labor productivity and to improve the economic mechanism itself. It is also necessary to have more specific balances of manpower resources by cities and rayons of the republic.

There is another aspect: our republic itself does not have many important types of raw materials. Metal, for example, is delivered, and this is more and more expensive--as is known, the raw material base in the country is moving farther and farther to the east. Hence, in principle, it is advantageous to decrease the materials-output ratio and metal content of

products and gradually, by means of economic levers, to make production science-intensive, where a greater intellectual potential and less metal are required. Unfortunately, here departmental interests for the present are also hindering the reorganization. It is also necessary to consider that it is three- to fourfold more expensive to build a new enterprise than to use the fixed capital of an existing one. The expenditures also have to be weighed.

But let us take our shale energy complex: atomic energy, which is being developed in the country, dictates the need for changes here as well. The large electric power stations of the republic should shift from the base mode of the generation of electric power to a maneuverable mode. Again technical reorganization and retooling, which will require much effort, capital and time.

A complex problem for the republic is the proposed development of the Rakvere phosphorite-bearing basin. It should be carried out in accordance with a technology, which will ensure the comprehensive use of raw materials and at the same time will not do harm to the environment.

The situations, which are connected with the requirements of scientific and technical progress, as you see, are quite complex. They exist in agriculture, transportation and the nonproduction sphere. Incidentally, particularly many people and assets are being channeled into this sphere, but the difficulties with both manpower and capital investments here, apparently, for the present will remain.

[Question] What is to be regarded as progress? We are glad, for example, that in our stores there are vegetables now the year round. But is there really no problem with their quality? The potatoes are "in bruises," the carrots have cracks and spots and so on. How much produce from the field still does not get to our table!

[Answer] And, note, it does not get there precisely because the latest, sparing means of transportation, storage and delivery are being used poorly. But without them, that is, without the complete reequipment of the entire economy, you will not solve the problem, you will not achieve genuine progress. Tomorrow will make even greater demands on everything without exception and on this sector as well.

Where are contradictions, the lag behind the requirements of the times and the inability to reorient oneself quickly under changing conditions still conspicuous? For example, in our textile industry. We produce thousands of meters of good quality fabrics, but they are not distinguished by either a fashionable structure or diversity, and garment workers at times have to order imported fabrics.

It must be seen to that it would be simply impossible to produce obsolete products. This is a question of the improvement of the economic mechanism.

[Question] Now I would like to ask: To what extent have all these ripe problems been incorporated in your comprehensive program of scientific and technical progress?

[Answer] The fact that it is comprehensive, also precisely testifies that we strove for a comprehensive forecast. More than 150 republic ministries, departments, institutions, organizations and enterprises have forecast the future of the republic for 20 years--with respect to mineral raw material and water, biological and manpower resources, land resources and the agroindustrial complex, transportation and trade. They have determined the future of the fuel and energy, chemical and machine building complexes and the socioeconomic consequences of some measures or others.

Practical experience shows that in a number of cases ministries and departments still consult little with the institutes which are responsible for technical progress in the given sector. The inertia of thinking tells.

Now we are developing a method of drawing up the next stage of the program. I will not go into details, here precisely the introduction of new equipment in the national economy has been made the cornerstone. The most basic questions of scientific and technical progress of the republic should be covered in it. This will be, so to speak, a general framework, in which the scientific and technical programs on the key problems for the republic (with the deadlines, resources, performers and outlined results) will be entered. Ideas about the future production structure of the national economy and its sectors, about the means of the best use of our resources and the cooperation and specialization of enterprises must also be formulated in these programs. The State Planning Committee will be able to include these programs, which are qualitatively new in their essence, in the plan of the development of the national economy of the republic, the method for this has already been elaborated by it.

[Question] In general, the path to progress is difficult, although, as it turns out, it is already possible to sketch a portrait of Estonia-2005 in some features.

[Answer] But this does not mean that reality will prove to be precisely that way in everything. Life will make its own adjustments. And in 15-20 years this scientific and technical progress itself will bring much of what we do not yet expect. It is all the more so necessary to be ready for this.

## Training of Specialists

Tallinn SOVETSKAYA ESTONIYA in Russian 20 Jun 84 p 2

[Article by Candidate of Economic Sciences Yu. Tartu: "The Accuracy of the Personnel Order"]

[Text] In recent times the problem of the training of specialists has become urgent in the republic. It is attracting the attention of both scientists and the public at large. This is due first of all to the two conflicting trends in this sphere.

On the one hand, as is well known, the national economy of the Estonian SSR has a high level of saturation with specialists. But in spite of the good

supply of the national economy as a whole, the shortage and overproduction of specialists in individual directions are still occurring.

The shortage is being observed mainly in technical specialties, such as the technology of machine building, industry thermal power engineering, automation and telemechanics and others. Overproduction is occurring in the humanities sphere, particularly with respect to university specialties. Such a situation formed due to the fact that in the past 15 years the graduation of students of the humanities has increased more rapidly than that of engineers. In pedagogical specialties alone high educational institutions annually admit more than 1,000 people (more than a third of all those enrolled as students).

Given such a disproportion between the training of staffs of specialists and the needs of equipment, technology, the organization of production and labor a portion of the economic potential is being used inefficiently, and therefore is not yielding the anticipated impact, while checking the introduction of the achievements of scientific and technical progress.

What are the factors which are causing this disproportion?

Let us examine first of all how the training of specialists is planned. The collection of requests for specialists from enterprises, organizations and departments is the basis for the system. The calculations for the planning of the need are made in accordance with the standard staff method. The making of them involves great labor expenditures. The obtaining of objective information on the need for specialists, especially in case of a large number of workers, is further complicated by the need for the breakdown of the workers by positions, education, age, sex, specialties and so on. Since the automation of these calculations is lacking, they have to be made by hand. Moreover, the plans of the technical and economic indicators of enterprises are not always approved by the start of the planning of the need for specialists, therefore the calculations of the need are poorly coordinated with the annual and five-year plans.

Moreover, the workers of the personnel divisions of ministries, departments and enterprises are not able to use adequately the list of specialties and do not know their essence. And frequently specialists with a pedagogical engineering education are requested for the positions of process engineers or design engineers, while a request for a mechanical engineer instead of an engineer in precision mechanics is submitted and so on. It is natural that the inadequate knowledge of the performers also affects the quality of the calculations, especially as frequently adequate demandingness and the monitoring of the correctness of the calculations themselves are absent, and therefore mistakes and errors are committed. As practical experience shows, the requests for young specialists are artificially overstated and obviously exceed the actual need. Here the tendency is being observed to request more specialists with a higher education, with whom they are then forced to man positions, which require of the workers only a secondary specialized education.

Talleks, the Plant imeni Kh. Pegel'man and others submit relatively high quality requests. But there are also organizations which in the past 10 years

have not once submitted their own orders for specialists to the Estonian SSR State Planning Committee. Among such organizations is the Estremrybflot Association. The Maardu Chemical Combine and the Estonbumprom Production Association have been submitting unsatisfactory materials and then inopportunely. A regularity is also clearly traced here--precisely these plants and associations are poorly supplied with specialists.

How is the interest of enterprises in the improvement of the dependence between the training and use of personnel to be increased? It is necessary, in our opinion, to use more extensively in practice direct ties between educational institutions and enterprises. That is, the planning and organizational conditions for the participation of enterprises in the strengthening of the material educational base of educational institutions should be created, their long-term cooperation with each other in scientific research work and the manning of educational institutions with young people, in the increase of the skills of staff members and instructors, as well as in the participation of specialists of the enterprises themselves in the training of the personnel being ordered should be established. In this respect it is possible to cite a number of positive examples. Lasting ties have been established between the Tallinn Polytechnical Institute and the Standard Production Association in the training of specialists in wood processing technology. The material educational base for this has been created at the association and the corresponding chair of the Tallinn Polytechnical Institute is located there. A chair of Tartu State University, at which physicists undergo training, has been set up at the base of the Institute of Physics of the Estonian SSR Academy of Sciences. At present at higher educational institutions the specialization of the training of future engineers in the processing method of wallboards and plastic materials for the Pyussi Plant and in the specialties "industrial planning" and "applied mathematics" for enterprises of the Ministry of Light Industry is under way. Geodesic engineers are specializing for the Estonian SSR State Committee for Construction Affairs, specialists in the sphere of economic cybernetics are specializing for the Estonian SSR Central Statistical Administration.

In recent times problems with the filling of positions have arisen at higher educational institutions. Frequently the overall plan on the admission of students is maintained, but with respect to some specialties its exceeding or underfulfillment is permitted. However, the national economy needs not specialists in general, but with respect to specific types. It is necessary to increase the responsibility of higher educational institutions for the fulfillment of the plan of admission and graduation with a breakdown by classification.

The problem of "unpopular" specialties is not to be solved by the simple increase of the plan of admission to them, since they usually recruit for these specialties those who have not been taken on in others by competitive examinations. Accordingly the dropout rate during training is also very high here (45-50 percent), and the graduating classes are therefore small. In order to get out of the formed situation, it is necessary to plan measures on the increase of the prestige of unpopular specialties: to promote effectively and clearly the scientific achievements in the corresponding fields of science.

The feminization of the student body has become another problem which requires attention. In several technical specialties, which envisage work under conditions which are not suitable for women, the proportion of girls among the students is too large. Therefore it is difficult to place them in a job in their specialty: enterprises and construction organizations, as a rule, refuse to hire women specialists for such a job. Nevertheless, as of October 1983, at the Tallinn Polytechnical Institute more than 34 percent of the students being trained in the specialty "industrial thermal power engineering" were women, "electrical systems and networks"--also more than a third, "industrial and civil construction"--a fourth of the students, "water supply and sewer systems"--more than 40 percent (!).

It would be necessary to revise the list of technical specialties from the point of view of an efficient ratio of the admission to them of boys and girls.

The making of changes in the plans of the training of specialists is a complicated process. It usually encounters opposition on the part of various instances, since it involves the retraining or even the replacement of personnel. But along with the development of the national economy the demand for some specialties or others changes, and, hence, the system of the planning of personnel training at higher educational institutions should react sensitively to these changes in order to conform to the real needs.

## Computer Technology

Tallinn SOVETSKAYA ESTONIYA in Russian 20 Jun 84 p 2

[Article by M. Kutser, scientific secretary of the Institute of Cybernetics of the Estonian SSR Academy of Sciences: "A Computer on Your Desk"]

[Text] Today computer technology is finding the most extensive application. In our conception the computer is usually connected with a computer center, but the immediate future will make in this radical changes, which are dictated by the appearance of microprocessor equipment.

It is clear that, for example, the computer, which controls the operation of a transportation robot which travels about a shop, can be located only in the robot itself. The microcomputer is becoming a part of equipment or a machine tool in exactly the same way as the governor on the steam engine of Watt did in its time. Moreover, special knowledge about either microprocessors or programming is no longer required of the person who works at such equipment. The compact and miniature computer based on microprocessors is also becoming an integral part of the workplace of the engineer. But the need has now already arisen to have personnel who are capable of using microprocessor equipment when developing new equipment and technological processes.

The mass introduction of computer equipment requires the corresponding amount of hardware components and skilled users of this equipment.

Our electronics industry is successfully accomplishing the task of developing microprocessor equipment, but at the same time staffs of programmers and engineers, who would be able to use it when developing new equipment and new instruments, must also be trained. The requirement of the simultaneity of both is complicating this task, otherwise the new equipment will not find quick application.

Specialists in computer technology and software are required in case of the introduction of microcomputers, just as in case of the introduction of any computers. The tools exist and the technology has been developed for the development of hardware components, for the development of software such tools--automated programming systems--began to appear only recently.

Some results, which are aimed at the development of such intelligent systems, which would facilitate the labor of programmers who are the developers of applied programs, have been obtained at the Institute of Cybernetics of the Estonian SSR Academy of Sciences. The PRIZ, DIMO, MEMO and SERP programming systems, which make it possible to automate many stages of programming, were developed here. These systems are being used extensively here in the USSR and in the CEMA countries.

The institute is also trying to make its contribution to the training of personnel. The base Chair of Cybernetics of the Tallinn Polytechnical Institute has been set up here, so that skilled scientists would impart their experience to future engineers. The students have the opportunity to do practical work at our institute, in particular, in the special design bureau of computer equipment, the furnishing of which with the latest domestic microprocessor equipment enables them to work at a most modern level.

In connection with the school reform our task is also to give students knowledge and skills in the use of modern computer equipment. For the production of inexpensive computers in the new future will make them accessible to every school. The institute has been conducting for a long time now experiments on the teaching of programming and work at computers to school children. Our results, just as the experience of the Siberian Department of the USSR Academy of Sciences, show that students of the 8th and 9th grades are capable of working at a computer and of programming quite professionally. Of course, it is impossible to organize mass instruction on the basis of a scientific institute, but it is possible to set up courses for interested teachers and to familiarize them with the possibilities and the methods of use of the latest ones--personal computers.

If we speak of the role of the institute and its special design bureau in the introduction of computers and microprocessors in the republic, it is impossible also not to point it out as a consultant. Such cooperation, of which new technical decisions or new equipment become the result, frequently arises on the basis of consultations. Here are examples of the successes. Instruments for the measurement of the strength and internal stresses of concrete were developed in collaboration with the Scientific Research Institute of Construction of the Estonian SSR State Committee for Construction Affairs--they were awarded gold medals of the Exhibition of USSR National Economic Achievements. A system of the automatic control of large grain

dryers was developed together with the Institute of Agriculture and Reclamation in Saku. Cooperation with the design and technological bureau of the Estonian SSR Ministry of the Meat and Dairy Industry also grew out of consultations--joint work on the automation of production processes at dairy combines, from which it is also possible to expect important results for the national economy, was the fruit. The majority of developments of cyberneticists have been introduced in production in the fraternal countries, but recently our speech synthesizer based on a microprocessor was turned over for series production in our republic to the RET Production Association. The contribution of the institute to the national economy could have been greater, if the means of extensive introduction had been found. The institute itself and its special design bureau do not have either such means or a technological base to copy the developed equipment and systems for the user.

However, we will recall: computer technology is of decisive importance for the acceleration of scientific and technical progress!

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RESEARCH CONTRACTING RESULTS EXAMINED BY PARTY OFFICIAL

Kiev RABOCHAYA GAZETA in Russian 7 Jun 84 p 2

[Article by N. Rusin, party organization secretary, Physical Chemistry Institute, UkSSR Academy of Sciences: "At the Contract's Command"]

[Text] The collective, and consequently the party organization of the Physical Chemistry Institute, UkSSR Academy of Sciences have set themselves the task of more rapidly attaining the production introduction of principally new technology based on fundamental research. We are striving to concentrate scientific efforts and material resources in those directions which would bring noticeable benefit to the national economy.

It was at an open party meeting three years ago that the question was raised concerning support to the initiative by the UkSSR Academy of Sciences' Institute of Electric Welding to work during the 11th Five-Year Plan under the slogan: "The Union of Creative Thought and Creative Labor for the Accelerated Creation and Introduction of New Technology and Manufacturing Processes", an initiative approved by the Ukrainian Communist Party Central Committee. At that time N. P. Yerfyushin, doctor of chemical sciences and head of the Department of the Physical Chemistry of Luminescent Materials came to the party office and said that his department considered it necessary to sign contracts with the Kineskop PO [Production association] in Lvov, the electrovacuum instrument plant in Zaprudnya and certain other enterprises in the USSR Minelektronprom [Ministry of the Electronics Industry] for joint work on a number of developments. Here, at the party office, they discussed the details of such contracts and N. P. Yefryushina offered to take the floor at the meeting and explain the department's proposals.

It turned out to be an interesting meeting. The speakers said that it is now no longer sufficient to only manage the sphere of scientific research. Developments and the assimilation of new technology and processes should concentrate on the rapidest possible production introduction of innovations. The pace of scientific and technical progress is often delayed not by the lack of promising ideas, discoveries and inventions, but by their slow mass introduction. The party meeting obligated managers of scientific departments and production shops at the institute's experimental plant to sign joint development contracts with enterprises and organizations.

All scientific and production units at the institute are now participating in target programs. These include 5 comprehensive scientific and technical programs of USSR Gosplan and the USSR State Committee for Science and Technology, 3 all union programs on fundamental research and a number of republic, regional and departmental programs. Our institute was confirmed as the head organization for the all union program of fundamental research, "Macrocyclic Complexes and their Analogues".

We have signed contracts with the chemical reagent plant in Cherkassy, the Monokristallreaktiv Scientific Production Association [NPO] in Kharkov, the NPO for Viticulture and Wine Making imeni V. Ye. Tairov in Odessa and with many other enterprises and organizations. For example, the joint obligations have accelerated the industrial assimilation of a new complex for kraun [crown?] esters at the Cherkassy chemical reagents plant.

After this memorable party meeting, how is the department headed by N. P. Yefryushina moving on the development of new cathode luminescent solids necessary for color TV tubes? The work has stepped up markedly. Department workers started to meet more frequently with technologists at the institute's experimental plant. The innovation was soon developed. Joint work with Kineskop made it possible to increase the production of color TVs and improve their quality. In the past 2 years alone the institute has had an economic effect of 1.8 million rubles from the introduction of the development at the Kineskop association, and our experimental plant has won the "Better Supplier" Diploma for the high quality of materials delivered and active cooperation with customers.

The joint work of scientists and production workers has made it possible to solve another problem in the manufacture of color picture tubes. Due to imperfections in the manufacturing process for the application of solid luminescent solids to the tubes' interiors, a large percentage of this material goes to waste. The thought arose to develop a system for collecting and purifying these wastes. This idea was warmly supported at the enterprise. After the appropriate refining the former wastes have been turned into income.

We are convinced that participation in the production introduction of scientific achievements tones up scientists intellectually, improves social activities in solving practical problems and overcomes a "laboratory" approach to life.

What other things about the Paton collective's experience interest us? The Welding Institute has a precisely defined set of obligations for scientists and production workers. We borrowed it. Now our entire "science -- production" cycle is divided into a series of independent stages, each of which has its own set of tasks and methodology for planning, financing and management. As a rule, delays in the solution of scientific and technical problems arise in the transfer of work results from one stage to the next. A commission for the control of scientific-production and economic activitiy set up by the party office now helps predict them by constantly tracking contract fulfillment. In addition at monthly party office sittings and party meetings we listen to communists' reports on their participation in introducing scientific achievements into production.

If there is a problem due to lack of preparation by managers of operations assimilating new technology or the lack of parts and materials or for many other reasons arising because of incomplete solutions to large intersector problems, then the party organization of the institute, the administration and their partners jointly turn for help from the appropriate ministries and departments. Creative work activity with production workers has repeatedly helped us overcome sector barriers.

The precise orientation of contracts towards final results has put the party organization in a position to more deeply analyze the activities of departments and laboratories, more attentively track the formation of their themes, evaluate how much has been done, reveal lagging sections and find the causes and participate in determining the most promising directions for further research. Party office sittings systematically hear reports on the fulfillment of socialist obligations assumed jointly with partner organizations. At one sitting it was recommended that the institute's trade union and Komsomol organizations control the course of contractual obligation fulfillment jointly with their enterprise partners and inform one another of work done. The trade union organization is concerned about the selection and improvement of effective moral and material incentives for labor cooperation.

The party organization is strengthening its attention to the rational use of scientific cadre, their attestation and reattestation and the assignment of communist scientists to the most important sections. It was decided to reorganize two departments, as they were poorly staffed with cadre having advanced qualifications in the problems studied. At the same time they set up two new departments in promising areas -- macrocycles and pesticides.

On analyzing department and laboratory activities, one comes to the conclusion that scientists' successful completion of various problems depends not only upon the level of special training and the breadth and depth of their professional knowledge, but also on their world view, ideological and methodological training, which find reflection in people's active lives. Among the forms and methods of our ideological and political education, wide acknowledgement has been given to the methodological seminar "Philosophical Questions in the Development of Contemporary Natural Science". The party office has entrusted the leadership of this seminar to G. L. Kamalov, a communist and a doctor of chemical sciences. The preparation of outlines, the problem approach and discussions help those attending the seminar not only to develop a Marxist Leninst world view, but also to master contemporary philosophy, general scientific methodology and the ability to effectively use them in research. The seminar's material is based on long term problem plans closely tied into state plans for scientific research work and to the tasks presented to science by the decisions of the 26th CPSU Congress and subsequent CPSU Central Committee Plena.

The institute's collective faces a serious task: the development and production introduction of patentable manufacturing processes for pesticides. Actively participating in the country's Food Program, our scientists have already developed herbicide formulas based on crown esters. They are being tested under field conditions for raising sugar beets. Jointly with the All

Union Selection Genetics Institute and the Kharkov Agricultural Institute, we will conduct research on the use of macrocyclic complexes as plant growth regulators, agents for preplanting treatment of seeds for grass crops with increased yield.

We maintain constant ties with metallurgical enterprises in the country and are giving assistance in production control and the analysis of raw materials and finished products. Small tonnage chemicals produced at our plant using institute work based on specially developed reagents and highly pure substances are finding wide use.

Unfortunately, we do not always succeed in establishing good contacts with production workers. Insolvable problems arise when solutions to problems depend upon representitives from sectors with which we have not previously had close contacts.

For example, the department for the physical chemical foundations of closed technological cycles, headed by Doctor of chemical sciences A. M. Andrianov is conducting interesting research on the waste free processing of Black Sea Red Algae -- phyllophora -- at the agar plant of the Antarktika Production Association of the Fish Industry. They have discovered, that in addition to agar, a whole series of components can be extracted from it. In particular, there is an iodine protein preparation not having any analogues in the USSR or abroad. An author's certificate has been issued for it. This preparation can be used as a metabolic stimulant in livestock and poultry feeds and put in table salt in areas with an iodine shortage. A metal corrosion inhibitor has been successfully tested for the acid etching of parts at the Odessapochvomash PO. The organic and mineral concentrate obtained from agar production wastes contains cobalt, manganese, zinc, boron, copper and other trace elements vital to plants has proven itself well in the hydroponic growing of grape seedlings. It should be kept in mind that phyllophora is about 20 percent protein. Reserves are quite great. About 100,000 tons of raw mass annually could be harvested without damage to reproduction. So far only about 10 percent of the possible catch is delivered for processing and it is not used efficiently. Even though research was completed five years ago, we had difficulty in conducting production tests just for the iodine preparation.

Take this problem. Recently the institute received an order from USSR Minplodoovoshchkhoz [Ministry of the Fruit and Vegetable Industry] for 800 instruments to detect very low levels of mercury. There were also several orders from other places. Metallurgical mercury and its compounds are widely used in the chemical industry, electrical engineering and instrument building. However, if it gets into the air, waste and natural waters and food products, it can accumulate in living organisms and have serious effects. This is why it is essential to have reliable, highly sensitive instruments to detect mercury in the environment, in buildings, certain types of production facilities and there output, and food products from the ocean.

Such instruments purchased abroad cost 6,000 dollars each. One plant in our country is producing only 50 units annually, costing 4,320 rubles each. Institute associates have developed a simple unit (producable even in a school machine

shop) which would cost about 200 rubles if series produced. It could be used in stationary and field conditions. It was demonstrated at the VDNKh [Exhibition for the Achievements of the National Economy] of the UkSSR and USSR, has received diplomas and good responses from specialists. The use of such instruments in the USSR Ministry of Civil Aviation had an economic effect of about 3.8 million rubles. Yet, they are not used in other sectors.

It seems to me that in such cases one is obligated to speak out strongly and sound the bell at councils for promoting scientific and technical progress which have been set up at party committees. These councils should compile catalogues of all scientific developments under way in the region and take the measures necessary for their most rapid production introduction.

The work of the party office and the directors of the Physical Chemistry Institute to accelerate the introduction of scientific research developments is giving positive results. In the three years of the 11th Five-Year Plan the total economic effect has reached 15.6 million rubles. The collective has been put on the republic Honor Board, in the Honor Book of the AN UkSSR Presidium, has been twice awarded the Challenge Red Banner of the AN UkSSR and the republic Trade Union of Workers in Education High Schools and Scientific Institutions.

However, this does not give us the right to take it easy. The party organization will search for new ways to accelerate the introduction of scientific research developments into the national economy.

11574
CSO: 1814/184

INSTITUTE DIRECTOR OUTLINES INNOVATION EXPERIMENT

Kiev RABOCHAYA GAZETA in Russian 15 May 84 p 2

[Article by I. Marchenko, director, Kramatorsk NIIPTmash [Scientific Research and Planning-Technological Institute for Machine Building], doctor of technical sciences: "What is Delaying Acceleration?"

> [Text] The CPSU Central Committee and USSR Council of Ministers decree on expanding the rights of industrial production associations (enterprises) in planning and economic activities to intensify their responsibility for work results provides for effective measures to give labor collectives incentives in accelerating the production introduction of scientific and technical achievements. Obviously, in an economic experiment there should be changes in the style of sector scientific research institutes and, what is equally important, in their relations with enterprises. I. K. Marchenko, director of the Kramatorsk NIIPTmash and doctor of technical sciences, shares his ideas about this.

The institute collective enthusiastically heard the news that our ministry was included among the participants in the large scale economic experiment. Under this experiment enterprises receive the right to independently use some resources from a unit fund for the development of science and technology not only to finance development work, but also to compensate for increased outlays during the introduction period. Moreover, it opens possibilities for improving production technical standards through the use of our own resources -- the enterprise development fund. This is included in the plan but allocated separately from centralized capital investments and not subject to withdrawal. All this opens prospects for more fruitful contacts between science and production.

Knowing that it is still a long time until the beginning of the experiment, we reexamined some of the main directions in our activities and principles for organizing cooperation with enterprises under our patronage. First of all, this meant the refining of the subjects for scientific work in order to concentrate the creative efforts of laboratories and departments on the solution of cardinal problems in improving the standards of metallurgical machinery building, the improvement of labor intensive processes at all production

stages. This is based on the development of automated manufacturing complexes, flexible adjustable systems, robotized sections and lines and low waste and energy saving processes.

A scale has been worked out to measure reductions in labor intensity as one of the main evaluation criteria. Such strict monitoring forces institute associates to solve various technical problems on the basis of given parameters rather than in a general manner.

The results were not slow in coming. The introduction of a new process for the manufacture of rods for small cast forms using a sand-resin mixture at the NKMZ [Novo Kramatorsk Machine Building Plant] will reduce the labor intensity of this operation by 50 percent.

Beginning this year the organizational side of operations has been improved. At our suggestion, bilateral schedules for technical reequipment have been introduced. These establish strict deadlines for the institute and for client enterprises, beginning with the delivery of design assignments and ending with assimilation. The schedule is controlled by the deputy minister of Heavy Machine Building, making possible up to the minute decisions on problems of material, financial and engineering support for the production introduction of scientific developments.

All the same, to completely utilize the possibilities opened up by the economic experiment, it is necessary to change the attitude, I would say the views, of some managers, and yes, of some engineers, toward science's role in public production. On the one hand, almost everybody agrees that science has now become a direct productive force. On the other hand, there are several barriers on the road to realizing this fundamental principle. What is more, the barriers are more often on the psychological than the organizational level.

Thus, in the present situation with regard to cooperation between science and practical work, the total economic effect far from completely describes the value of introduced developments. At existing production volumes it is indeed huge. Even a low cost innovation, not containing anything new from a scientific perspective, on a national or even a sectorial scale, has an effect measured in millions of rubles. This only is in the estimates. It is another thing to spread this low cost innovation throughout the economy.

It is therefore proper that compensation paid to creative collectives of scientists and to institutes not be based on arithmetic estimates made on paper, but on the real economies obtained from the developments' introduction. Also, in such cases their actual scientific and practical value should not be determined with a exclusively ruble orientation. An innovation which fundamentally improves a manufacturing process and which is a departure from traditional energy and labor intensive technology is the only kind which can be genuinely effective. The activities of our institute's associaties are directed towards just such goals, and no matter how difficult they are, they are being quite successfully solved.

One can endlessly work on the improvement of, say, the acetylene burning of metal, creating new torch designs, attempting to mechanize it, etc. In doing this, however, the process itself remains unchanged -- lots of expensive oxygen will be used. Associates at our institute G. Larin, P. Rudometkin and M. Brovman and others solved the problem in a basically new way: they rejected the use of acetylene entirely. They developed a natural gas based process for burning thick pieces of metal. This immediately increased productivity by 4 - 5 fold and opened the possibility for easily mechanizing labor. The economic effect from the introduction of the device at the neighboring NKMZ, Uralmash and some other plants amounted to 1.5 million rubles.

It turns out, however, that the monetary sums are not so impressive. This above all applies to scientific developments which, on the one hand, are not copied in large numbers although they are very essential to the national economy, and, on the other, to those, the cost of which sometimes reduces the effect expressed in rubles.

The "phenomenon of copying" ["tirazhirovaniye"]of scientific trifles, is well known among scientists. It must be admitted that up until recently it had a negative effect upon the pace of scientific progress in general. In order to attain financial respectability, it has been advantageous to collectives, especially at sector scientific research institutes, to work on penny ante developments, not requiring great creative efforts, but which had the potential for large scale copying.

There is another side to the problem. If one analyzed innovations for which there are blueprints, but which have not yet been introduced, and there are quite a few of them gathering dust on the shelves of any institute, as a rule one sees that they require substantial initial investments, and consequently large efforts on the part of the enterprise. There are such innovations at our institute.

Several years ago it became acutely necessary to rebuilt the Starokramatorskiy Machine Building Plant [SKMZ]. Following USSR Mintyazhmash [Ministry of Heavy and Transport Machine Building] assignments, in 1980 - 1981 we developed a semicontinuous casting line and an impulse moulding line for the SKMZ. Alas! at the last minute they were eliminated from the plans in order to lower reconstruction costs.

The scientific and design work on these innovations required considerable state resources and creative efforts by institute associates. The blueprints lie in the archives and are of hardly any use to anybody, because they were made just for the SKMZ and its specific conditions and products. But even this is not the problem. Without our units and lines the reconstruction will not lead to improved technical standards for casting operations, nor to the mechanization of casters' heavy manual labor. In other words, the goal of reconstruction will not be reached and the technical level of casting operations at the SKMZ will remain extremely low. Isn't this an example of a basic misunderstanding of science's productive potential?

The closest approach to the daily needs of production and the attitude of practical workers are in the so-called "Order No. 1" issued at any enterprise

at the beginning of the calendar year. A special section in such orders includes scientific and technical measures which should support the fulfillment of control plan targets.

What things one encounters in them! Together with the introduction of real scientific innovations they contain purely engineering, intraplant measures not having any relationship to technical progress. It appears that this section in "Order No. 1" should be entirely and completely purged of husks and should include only those developments which really support scientific and technical progress. This would discipline collectives at scientific research institutes, enterprises and services at ministries, forcing them to be prompt in taking the essential measures.

There is another factor. The existing methodology for determining the economic effect from the introduction of modern automated manufacturing processes does not stimulate enterprises' interest in them. This is because it does not include the social factor, but is restricted to estimates of wages fund savings from releasing workers. Due to high prices for equipment and electronic systems and the long pay off period for robotized systems, in the view of such methodologies enterprises do not receive a substantial effect.

However, this is not the case! The reduction of working personnel leads to large economies on social outlays for housing, services, etc. Why not take this into consideration when estimating the effect from the introduction of flexible adjustable systems, for example? Apparently, the State Committee on Science and Technology is working on a new methodology which would fully include the advantages of production robotization and cyberneticization.

Finally, the introduction of fundamentally new technology -- and it is all based on cybernetics -- is delayed by the lack of enough specialists in the repair and servicing of computerized, automated systems. At the initiative of the Ukrainian Communist Party gorkom, in our city faculties and departments in these fields have been opened at the industrial institute, the machine building tekhnikum and at some PTU [Planning and technological administrations. However, this is a drop in the ocean. Obviously, the Ministry of Higher and Secondary Specialized Education and republic Gosprofobr [State Committee for Vocational and Technical Education] should more flexibly meet the needs of industry. Thousands of specialists with a very wide range of skills in robot technology are now needed. Tomorrow the figure will be tens of thousands.

11575
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UNITY OF INTERESTS, RESPONSIBILITY IN INTRODUCTION OF ACHIEVEMENTS

Moscow SOVETSKAYA ROSSIYA in Russian 18 May 84 p 1

[Article by economist Georgiy Kulagin: "Introduction: The Unity of Interests"]

[Text] Our country has the largest engineering corps in the world--its size as compared with the prewar period has increased by several fold and at present exceeds 5 million. In the number of scientists, which is approaching 1.5 million, we also hold first place in the world, here a significant portion of them are connected directly or indirectly with the development of new equipment.

Soviet engineers and scientists have to their credit many world-class achievements: the first nuclear electric power station in the world, the first satellite, the flight of the first cosmonaut, the largest hydroelectric power stations, giant turbines, generators and reactors, nuclear-powered icebreakers, the transmission of electric power over very long distances, first class aviation and much else.

At the same time, as is indicated in the decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures on the Acceleration of Scientific and Technical Progress in the National Economy," the organization of the work on the use of the achievements of science and technology in the national economy still does not completely conform to the tasks posed by the party and requires radical improvement.

Therefore we cannot be content with the achieved rate of scientific and technical progress and the degree of utilization of our giant intellectual potential. As is known, we are not yet the standard in many sectors of machine building, chemistry and electronics. The following comparison is also alarming. During the 10th Five-Year Plan our industry on the average annually assimilated in series production 2,750 new machines, equipment, apparatus and instruments. If we consider that only half of the certified engineers took part in their development, while the other half was engaged in purely administrative, teaching and other types of activity, which do not have a bearing on the development of new equipment, even in case of this assumption years and years of engineering labor fall to one new technical item.

The explanation of such facts is usually linked with the difficulties of the introduction of new developments in production. Here the developers bring to the forefront the conservatism of the producers, the producers bring to the forefront raw materials and unfinished plans, and both sides together lament in unison the inadequate development of the experimental base and the imperfection of the economic mechanism, which gives preference to the stimulation of quantitative indicators to the detriment of the assimilation of new equipment.

All this is really so, but, in my opinion, is not the basic obstacle. The main thing, in my opinion, lies in a certain isolation of developments from production, which formed earlier and is now coming to light, in not only the organizational, but, what is much worse, the legal, financial and economic isolation. This isolation in practice also prevents the unity of responsibility for the actual development of new equipment and even often leads to the opposition of the economic interests of the developers and producers of new items.

Therefore the mentioned decree of the party and government requires particular attention to be devoted to the implementation of such economic and moral measures, which would interest in the production of equipment and technology all the participants in their development and introduction in production. Of course, it is a question not simply of equipment, which is "new according to the date of production," but only of that equipment which ensures a real increase of labor productivity. The unity of the interests and the unity of the responsibility of all the participants in the development of new equipment are the most important condition of the observance of this immutable rule. What is the situation with the observance of this rule in practice?

Today about half of the creative engineers and nearly all applied scientists are concentrated at sectorial scientific research institutes and design bureaus, which have legal and cost accounting independence. The planning and evaluation of the work of these institutions, their financial well-being and, speaking in prose, the availability of money in the till and the timely payment of wages are linked very weakly, and at times not at all, with the end result of the overall work, in which they perform only the first operations and which the manufacturing plants of new equipment complete.

Let us recall that in the relatively recent past developers in our country constituted an integral fundamental part of plant collectives. However, later we removed them from the staffs of plants and on their basis set up numerous independent design bureaus and scientific research institutes. This was done mainly for the purpose of improving the departmental indicator of labor productivity, which, as is known, is determined by dividing the volume of produced output by the number of workers. This formal and as if harmless statistical method, first, opened a wide path to the poorly controlled growth of the staffs of scientific research institutes and design bureaus and to the corresponding decrease of the output of their workers. And, second, it had an obviously adverse influence on the connection between the evaluation indicators of scientific research institutes and design bureaus and the real economic impact from their activity, having replaced it with intricate calculations of "the conditional saving."

Not the finished, tested machine or processing method, but sketches, reports and other technical specifications became the "commodity production" of the majority of cost accounting scientific research institutes and design bureaus. The payment for it is made in accordance with price lists subject to the format and number of sketches and their "group of complexity." It frequently turns out that the more paper output there is and the more complicated it is, the more income the cost accounting design bureau has.

You will not make a good machine "at sight"--it is necessary to build it and test it thoroughly before placement into series production. Meanwhile given the separate legal and cost accounting existence of the developer and producer fertile soil is created for the shifting of the blame onto each other and for the endless dragging out of this important stage.

The numerous attempts to link the payment of independent scientific research institutes and design bureaus by "unified orders" with the ultimate efficiency of the equipment developed by them, frankly speaking, so far have yielded hardly anything in practice. For it is necessary to pay wages to the staff members every month, while years pass between the completion of the designing of such complex machines as machine tools, turbines and aircraft and their assimilation in series production. Therefore, for the acceleration of the introduction and the actual, large-scale assimilation of new equipment it is necessary, obviously, first of all to restore the disturbed unity of interests of its developers.

How is it possible to do this? It would be useful, it seems to me, to return all the design bureaus and scientific research institutes, which are engaged in specific design developments and the research accompanying them, to the production associations and enterprises, which produce the equipment designed by them. Here it is entirely insufficient to ensure only administrative unity, as has been done today in many instances. If the plant and institute have a common director, but here belong to different "statistical" sectors and retain legal independence, separate balance sheets and accounts at the bank, such alliances are of no use. Experience shows that such an association does not eliminate completely the difference, and at times the opposition of the interests of each side. It is much more important to ensure complete cost accounting unity so that the financing of design bureaus and scientific research institutes, except for especially complex and fundamentally new developments, would be carried out by means of the association's own assets, which were obtained from the sale of the products produced by them, or by means of bank credits, which are repaid from the same source.

If the scientific research institute or design bureau serves several plants, it is probably useful to attach a pilot plant to them, that is, to transform them into a scientific production association so that it would fully develop the "new item" in metal and would supply series-producing plants not only with technical specifications, but also with accessories and would help on a contractual basis to assimilate the new production.

In individual cases, which are envisaged by the well-known decree of the CPSU Central Committee and the USSR Council of Ministers, it is permitted to plan

all the activity of such scientific production associations in accordance with the sector "science and scientific service." But in these cases as well the activity of such scientific production associations, in my conviction, should be paid for by means of the impact obtained by the enterprises which use its developments.

The right to independent existence, apart from academic institutes, in my opinion, must be left only for the applied scientific research institutes which are engaged in the primary, "pioneering" introduction of the latest discoveries of science in the practice of production, for example, such developments as the assimilation of thermonuclear power and optical electronics, the development of holographic movies and so forth. Of course, a strictly limited number of central institutes, which carry out the coordination and expert appraisal of the activity of enterprises in the area of new equipment and the elaboration of long-range plans and standards, should also be retained.

The designer in the age of the scientific and technical revolution remains the main figure of technical progress, but he advances it only together with the production worker. Both of them, according to the definition of Marx, are a part of the "aggregate worker" and should act with the framework of a unified cost accounting organism, which bears full responsibility for the end results of their joint work. The elevation of the developer to the rank of a scientist brings him out from under the control of the economy, for the sake of the progress of which he exists.

It seems to us that the main thing today consists in fulfilling completely and unconditionally the instructions of the 26th CPSU Congress on the need to link more closely--economically and organizationally--scientific research, planning and design work with production.

7807
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SCIENTIFIC RESEARCH NEEDED TO IMPROVE PRODUCTION

Kiev RADYANS'KA UKRAYINA in Ukrainian 12 Jan 84 p 2

[Article by V. Poturayev, member of the UkSSR Academy of Sciences and head of the Dnieper Scientific Center: "Comprehensive Scientific Programs--To Open Up New Horizons"]

[Text] For decades the workers of the metallurgical plant imeni Petrovs'kyy built up experience in the economical utilization of rolled metal. In their time they were the first in their field to adapt the production of economical types of rolled metal for the automobile industry. This fact now belongs to history. But to a history which has had its continuation. To ascent to higher levels, the metallurgists' own resources would not suffice. Here, scholars can provide essential aid. And indeed, last year the Dnepropetrovsk Oblast Party Committee approved a proposal of the Petrovs'kyy workers and the collectives of the Metallurgical Institute imeni L. I. Brezhnev and the Institute of Ferrous Metallurgy of the USSR Ministry of Ferrous Metallurgy, the essence of which was to maximally cultivate the extent of progressive rolled metal. And today we can already speak of hundreds of tons of metal conserved for the national economy.

Similar creative contacts between scientists and producers are being established at the Dnieper Scientific Center. It has undertaken the responsibility of coordinating the activity of scientific institutions, regardless of their departmental subordination, in order to direct the efforts of scientists toward the solution of the most immediate scientific-technical problems of the region.

The center's work is headed by its council, which includes leading scientists and representatives of party and Soviet organs and of social organizations of three oblasts--the Dnepropetrovsk, Zaporozhe and Korovograd.

With the aim of solving the principal problems of the socio-economic development of the Dnieper region, the councils of the party obkoms and the scientific center, by agreement with the interested ministries and departments, have prepared comprehensive plans for scientific research and the acceleration of technical progress in the fundamental branches of the national economy. Agreements on cooperation of all three party obkoms with the UkSSR Academy of Sciences, as well as the agreement on mutual association of the presidium of the Academy of Sciences of the republic and the UkSSR Ministry of Ferrous Metallurgy, also contribute to this project.

The collectives of 117 scientific institutions and 14 VUZ's, and over 170 workers' collectives, subordinate to more than 30 union and republic ministries and departments, are working on the realization of our programs.

A characteristic feature of regional programs are concrete, clearly designated tasks. For the first time in world-wide practice, the groundwork was laid for the technology of thermal reinforcement of armature steel and of shaped profiles of rolled metal with utilization of the heat from the heating of rolled metal and of fundamentally new forms of armature which save nearly 50 percent of the metal, by scientists of the Institute of Ferrous Metallurgy of the USSR Ministry of Ferrous Metallurgy. Finally, at the blast-furnace workshops of the Kryvorizhstal' and Dnieper imeni Dzerzhinskiy plants, optimal slag conditions were introduced; this makes it possible to pour close to 100,000 tons of cast iron additionally each year.

It has not been only the metallurgical scientists who have noticeably influenced the state of affairs in their fields in the last 3 years. The annual economic effect of the projects completed as part of the "Ruda" program already constitutes over 12 million rubles. This program has a special significance: it can be considered a landmark in the development of the mining industry of the region, primarily of the Kryvyy Rog basin which, figuratively speaking, is undergoing a re-birth. Collectives of scientists are now researching, developing and introducing new technologies of extraction and enrichment of magnetic quartzites as well as methods of repeat utilization of compounded "tails" of active combines. The Kryvyy Rog Scientific Research Institute of Mining, the Dnepropetrovsk Mining Institute, the UkSSR Academy of Sciences Institute of Geotechnical Mechanics, and Mekhanobrchormet are working in this direction. At the Mine imeni Dzerzhinskiy, for example, a method for the enrichment of ores deficient in iron is being tried out. But the greatest achievement has been the development and introduction of progressive cyclical-line technology for open mine works in the quarries of the Kryvyy Rog area. The UkSSR State Prize in the area of science and technology was awarded to a large group of originators of these innovations in 1983.

The majority of new decisions immediately finds acceptance in mining production. The UkSSR Academy of Sciences Institute of Geotechnical Mechanics, for example, proposed an original method for extraction of manganese ore which has so far remained in the interior beneath the paving-blocks of the quarries. Now 150,000 tons of "excess" ore are extracted each year in the Nikopol' basin.

One must not neglect the completion of the "Harvest" program. Here we have rich traditions. This concerns methods of re-cultivation of lands damaged by mining operations and the creation of high-yield corn hybrids. And today, scientists of the All-Union Corn Institute together with agricultural specialists and mechanizers are occupied with the massive introduction of industrial technology of cultivation of corn, and have set themselves the goal of insuring a yearly harvest in the neighborhood of a million tons of corn grain.

Here it is necessary to note that the Dnepropetrovsk Party Obkom and the Dnieper Scientific Center are devoting careful attention to basic research as well, understanding how important it is for technological progress in production.

But occasionally we still suffer losses because we stop, one might say, midway. For example, at the Dnepropetrovsk Mining Institute there was developed a technology for preparing nuts by a method of plastic deformation. A trifle? No. An original, very simple method of carving the thread was developed. The invention was protected by an inventor's certificate and was patented in the U.S., FRG, Japan, France, Sweden and Italy. The new, totally wasteless technology is suitable for utilization in tube-rolling industry as well. One needs only to found a branch laboratory for further research; nevertheless, the republic Ministry of Ferrous Metallurgy is not hurrying with this.

Another side of the problem is the level of scientific research and investigation. We pose the problem thus: if a new machine or a new technology is not protected by an inventor's certificate, this means that the work has been performed below the existing level and there is no reason to introduce it. We must pay more demanding attention to the competitiveness of our projects.

That which has already been done and which is being done in the matter of regional planning and administration we consider to be only the beginning of the realization of new forms and methods of influence on scientific-technical progress in the economy of the oblast. For this reason it is necessary to make efforts to perfect the system in an essential way. For our present comprehensive programs do not embrace the entire variety of problems of social production in the region--to a significant degree, they limit themselves to the repetition of the points of thematic plans of the leading scientific-research and planning-construction institutions. This is not to the benefit, first of all, of production.

So far the desirable harmony between the 5-year plan of social-economic development of the oblast and the annual plans of development of science and acceleration of scientific-technical progress, through comprehensive regional programs, does not exist. The task which in this connection confronts the council from the scientific-technical progress of the party obkom and the scientific center comes down to the working out of scientifically based practice of administration of technological progress. We are convinced that the deepening of the territorial-branch principle and also of the comprehenisve resolution of socio-economic problems requires the preparation of long-term regional scientific programs, which would serve as the basis for 5-year and annual plans for scientific research, technological development and organization of production.

And is not the raising of the level of basic research the most important task for us? Only this is capable in the future of ensuring essential changes in production.

12703
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ACHIEVEMENTS, RELATIONS OF BELORUSSIAN SCIENTIFIC ORGANIZATIONS

Minsk PROMYSHLENNOST' BELORUSSII in Russian No 5, May 84 pp 34-35

[Article by G. Golovnitskiy, member of the republic review commission: "Ties Are Being Strengthened, the Yield Is Increasing"]

[Text] The republic Council of Scientific and Technical Societies, the republic board of the scientific economic society and the editorial office of the journal PROMYSHLENNOST' BELORUSSII have tallied the results of the republic public review of the work of scientific research institutes, higher educational institutions, enterprises and associations on the introduction of the results of research in production. The works of 37 academic and sectorial institutes and scientific production associations, 9 higher educational institutions and 28 enterprises and associations of the republic were presented for the review. The majority of scientific research institutes and higher educational institutions, which took part in the review, have made a significant contribution to the implementation of the union and republic scientific and technical comprehensive goal programs and the programs on the most important scientific, technical and economic problems. In 3 years of the five-year plan 1,440 scientific developments in the amount of 99.6 million rubles--nearly as much as in accordance with economic contracts--were fulfilled by them in conformity with the assignments of these programs. Here the efficiency of research increased, the time of the introduction of completed works was shortened.

The review also showed that scientific research institutes, higher educational institutions and enterprises are broadening and strengthening interrelations by the conclusion of contracts on creative cooperation and the setting up of public educational scientific production associations (following the example of the Minsk Motor Vehicle Plant-the Belorussian Polytechnical Institute, the Minsk Tractor Plant-the Belorussian Polytechnical Institute, ANGOM [expansion unknown] and others).

The Scientific Research Institute of Powder Metallurgy (the Diploma of the Belorussian Republic Council of Scientific and Technical Societies and the first monetary prize), the Physical Technical Institute of the Belorussian SSR Academy of Sciences and the Scientific Research Institute of Soil Science and Agrochemistry (Diplomas of the Belorussian Republic Council of Scientific and Technical Societies and the second monetary prizes), the Scientific Research Institute of the Primary Bast Fiber Processing Industry, the Institute of

Electronics of the Belorussian SSR Academy of Sciences and the Tekhenergokhimprom Scientific Production Association (Diplomas of the Belorussian Republic Council of Scientific and Technical Societies and the third monetary prizes) achieved the best indicators during the review among the scientific institutions. Among educational institutions Diplomas and the corresponding monetary prizes were awarded to the Belorussian Technical Institute imeni S. M. Kirov, the Belorussian Institute of the Mechanization and Electrification of Agriculture and Gomel Polytechnical Institute.

At enterprises and associations of the republic considerable work is being performed with the participation of scientists on the increase of the technical level of production and labor productivity and the improvement of production quality. Thus, the Minskiy traktornyy zavod imeni V. I. Lenina Production Association has ties with 60 scientific research institutes and higher educational institutions (economic contracts and contracts on creative cooperation, cooperation within the educational scientific production association of the Minsk Tractor Plant-the Belorussian Polytechnical Institute and so on). The economic impact from the use of 127 completed scientific developments since the beginning of the five-year plan came here to more than 24.6 million rubles (3.5 rubles per ruble of expenditures).

The Integral Production Association, the Belorussian Optical Mechanical Association, the Gomel Elektroapparatura Plant, the Minsk Progress Knitwear Production Association and the Novopolotsknefteorgsintez Production Association have also established extensive and stable relations with scientific institutions. They were all awarded Diplomas of the Belorussian Republic Council of Scientific and Technical Societies and the corresponding monetary prizes. In all 43 scientific research institutes, higher educational institutions and enterprises of the republic were commended with Diplomas and Honorary Diplomas for active participation in the strengthening and broadening of the contact of science with production.

The boards of the republic scientific and technical societies of light and the machine building industry, radio engineering, electronics and communications imeni A. S. Popov, the All-Union Chemical Society imeni D. I. Mendeleyev, agriculture, the instrument making industry imeni Academician S. I. Vavilov and others have improved their work.

The Presidium of the Belorussian Republic Council of Scientific and Technical Societies recommended to the boards and councils of scientific and technical societies of the republic to generalize and to disseminate extensively the experience of the best primary organizations of the scientific and technical societies of scientific research institutes, higher educational institutions, enterprises and associations.



7807
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KARPOV INSTITUTE DIRECTOR EXPLAINS SCIENTIST REVIEW SYSTEM

Moscow SOVETSKAYA ROSSIYA in Russian 13 Jun 84 p 4

[Article by Ya. M. Kolotyrkin, member, USSR Academy of Sciences, director, Physical Chemistry Institute imeni L. Ya. Karpov: "Attestation of Creativity"]

> [Text] Some scientific institutions use a new system for the evaluation and payment of scientists' labor. This system does not depend directly upon degrees and knowledge, but upon their direct contribution to a unique final result and research efficiency. However, few know the essentials of this system. It would be good if an informed person would explain it. it.
>
> N. Artamonov, student

Academician Yakov M. Kolotyrkin explains:

The interest of each associate in maximum work efficiency and an orientation towards participating in the most important problems for scientific and technical progress are important conditions for a scientific collective's fruitful work. At present, however, this orientation is seriously hindered by scientific workers' excessive interest in the quickest preparations for the defense of candidates and doctoral dissertations, which sometimes become the main research goal and too often move along the easiest and most well trodden paths of science. Having defended a dissertation, associates often take it easy, lag in their creative work and reduce their output. An obvious reason for this is the dependence of pay primarily upon scientific degrees and titles and the lack of a tie to a scientific worker's real results.

A new system for paying the labor of scientific workers, which became known as the "Karpov System" was once proposed as an experiment at the Physical Chemistry Scientific Research Institute imeni L. Ya. Karpov. Essentially, the institute management can either increase or, and this is very important, reduce an associate's wages in direct dependence upon the real efficiency of his labor, which is periodically reviewed by an attestation commission. About 60 institutes in various ministries and departments, including institutes of some republic Academies of Science and one institute in the USSR Academy of Science, have converted to such a system.

The experiment turned out to be very important for young workers not having an academic degree, enabling them to overcome the large pay gap between scientific associates with or without a degree. A capable worker, completely giving himself to work, can earn practically as much as the average Junior Scientific Associate with a candidate's degree. There is thus no need to hurry with a dissertation. It can be the result of creative participation in a problem of great scientific and practical significance.

Everyone knows what a difficult, almost insolvable problem it is to dismiss an associate who is working poorly. After the introduction of the new system at our institute the solution to this problem was simple: An associate whose work was deemed inefficient by attestation either finds the power to substantially improve work results or leaves the institute. This has made it possible for the management to open additional vacancies for Senior Scientific Associates right after reattestation. These are filled by Junior Scientific Associates with candidates degrees who received the highest evaluations during attestation.

It seems to me that the experiment not only markedly improved the qualitative composition of scientific staffs, and the entire creative atmosphere at the institute, but also had a favorable morale and psychological effect upon the collective. After all, the positive result of reattestation is not only increased pay for the associate, but also solidly based public recognition of the value of one's contribution to a given scientific or technical problem. This moral incentive is at least as important as the material ones.

As the most difficult and responsible aspect of the experiment is the evaluation of Junior Scientific Associates' work efficiency, special attention should be given to commissions' staffing and functioning. They included leading scientists at the institute and the most authoritative representitives of party and trade union organizations.

The criteria for evaluation, taking into consideration the institute's specific conditions, were: the theoretical and experimental standards of research, an associate's initiative and degree of independence, the scientific and practical significance of the results obtained, participation in the production introduction of scientific developments; in evaluating managers' work serious attention was given to work organization in the unit.

However, the nature of scientific work prevents it from being evaluated by formal criteria without serious harm. Therefore the decisive role in our experiment was given to the expert evaluation of an associate's work by highly qualified scientists having a good knowledge of the field and of the specifics of research work.

Collective expert evaluation, based upon an associate's entire creative activity and not only upon some quantitative indicators, can, when combined with the publicity of results and the right of the person reviewed to appeal the commission's decision, maximize the objectivity of conclusions and practically completely avoid conflicts. The importance of commission members' personal example also became clear: If they are principled and uncompromising when evaluating

associates in their laboratory or department, the collective also supports other decisions. Incidentally, we note that the frequent categorical assertion that it is impossible to evaluate the efficiency of scientific work is, as a rule, caused either (if it is stated by a manager) by the desire not to damage relations with others whose pay must be reduced, or by the fear of falling into this group. In fact, every healthy collective is well aware of who is working well and who is working poorly.

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